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ABSTRACT

This document contains six studies that were commissioned for the National Assessment of Vocational Education. "Introduction" (Ann M. Milne) provides an overview of the reforms of the 1980s. "The Impact of Educational Reform on Vocational Education" (Marion Asche, Donald E. Elson, Ann Echols, Arthur Williams) examines primary strategies of reform and reform in vocational education (VE). "Contextual Learning: A Review and Synthesis" (Nancy Karweit) summarizes the cognitive science perspective, differentiates general and context-specific knowledge, and discusses cognitive apprenticeships and contextual learning. "Integrating Academic and Vocational Education: A Review of the Literature, 1987-1992" (Cathleen Stasz, Tessa Kaganoff, Rick Eden) considers the integration mandate and the current status, observed outcomes, and future directions of integration practice. State and district-level policies regarding secondary- and postsecondary-level VE are explored in "Integrating Academic and Vocational Education: Progress under the Carl Perkins Amendments of 1990" (W. Norton Grubb, Cathy Stasz). "A Literature Review for Tech Prep" (Gerald C. Hayward, Carolyn J. Dornsife, Debra D. Bragg, James L. Hoerner, Darrel A. Clowes) outlines tech prep's economic and educational context, essential features, and development and implementation. "Performance Standards and Measures" (Brian Stecher, Hilary Farris, Eric Hamilton) explains the process of implementing standards and measures of performance. Most papers contain substantial bibliographies. (MN)

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EDUCATIONAL REFORM AND VOCATIONAL EDUCATION

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NATIONAL ASSESSMENT
OF VOCATIONAL EDUCATION

EDUCATIONAL REFORM AND VOCATIONAL EDUCATION

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PREFACE

The studies in this volume were commissioned for the National Assessment of Vocational Education. They provided invaluable source material for the Assessment. For readers interested in the reform of vocational education, these studies provide necessary background to the Assessment.

The papers address a range of issues related to the reform of vocational and occupational education. The first, by Asche and associates, examines the effects of the academic reform movement on vocational education. In some important ways, the efforts to reform vocational education were prompted by the movement.

The volume addresses the principal areas of vocational education reform prompted by the 1990 Perkins Act—integration of vocational and academic studies, technical preparation (tech prep), and performance standards. Three of the studies deal with the complex integration issues. Karweit's paper examines the theoretical underpinnings of integration by reviewing the literature on contextual learning. Stasz and her associates narrow the focus by reviewing the empirical research on one broad type of contextualized learning-academic/vocational integration. Grubb and Stasz use survey data to assess the extent to which integration has been implemented in schools and classrooms, as required by the Perkins Act.

The literature on tech prep is reviewed in the study by Hayward and associates, which contains the findings of case studies that the authors conducted. The final paper is by Stasz and associates, studying the implementation of performance standards. Using survey data, the authors assess the implementation of the Perkins Act requirement that states develop standards and measures for vocational programs.

These studies provide information that many readers will find useful in efforts to reform vocational education.

BIOGRAPHICAL SKETCHES

Editor

Ann M. Milne is president of AMM Associates, Incorporated, an education policy consulting firm in Washington, DC. She specializes in research on federal education programs including Chapter 1, special education, and vocational education. She contributed a community case study report to the 1994 National Assessment of Vocational Education.

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Rick A. Eden is a policy analyst at the RAND Corporation, where he works in a variety of policy areas including vocational education. He has fifteen years of teaching experience at the adult level, and has taught undergraduate and graduate courses in writing, rhetoric, and composition pedagogy.

Donald E. Elson is associate professor in the Division of Vocational and Technical Education at Virginia Polytechnic Institute and State University. His expertise is in program evaluation, employee and employer follow-up systems, and adult education. He also currently serves as co-director of a project to implement a system of core standards and measures for secondary vocational education programs throughout Virginia.

Hilary Farris is a cognitive psychologist, formerly employed at the RAND Corporation. Her research focuses on developing and testing models of human reasoning and learning. Her applied research utilizes this theoretical foundation in investigations of education and training, and health care provider and consumer behavior.

W. Norton Grubb is a professor at the School of Education, the University of California, Berkeley. He is also a site director for the National Center for Research in Vocational Education. He edited a two-volume work on the integration of academic and vocational education entitled *Education Through Occupations in American High Schools*, and he is the author of forthcoming books on the role of community colleges in improving the education of the sub-baccalaureate labor force, and on teaching in community colleges.

Eric Hamilton is a former resident consultant in the Social Policy Department at the RAND Corporation. He is currently a policy analyst with the Center for Health Care Evaluation, Department of Veterans Affairs and Stanford University School of Medicine, where he is conducting research on substance abuse treatment.

James Hoerner is professor of vocational and technical education at Virginia Polytechnic Institute and State University. His areas of expertise include tech prep and at-risk students in postsecondary education.

Tessa Kaganoff is a research assistant in the RAND Corporation's Human, Material, and Resource Policy Department, working primarily in the area of education and training policy. She has worked on several projects sponsored by the National Center for Research in Vocational Education, including a study of the skills and attitudes required for successful employment in the workplace, focusing on workers with less than a baccalaureate degree.

Nancy Karweit is a principal research scientist at The Johns Hopkins University Center for Research on the Education of Students Placed at Risk (CRESPAR) where she is co-director of the Early Learning Project. Dr. Karweit has authored or co-authored four books and numerous articles, technical reports and conference papers. Her work has focused on school organization, time and learning, disadvantaged children and integrated curriculum. In addition, she has worked extensively on *Prospects*, the national study of Title I (Chapter 1).

Brian Stecher is an Associate Corporate Research Manager and Social Scientist at the RAND Corporation. His primary research interests are educational measurement, assessment and educational technology.

Arthur S. Williams is an assistant professor in the Business Education Department at Murray State University in Kentucky. His research interests are in computer applications and testing and measurement in computer operations. Dr. Williams has also worked as a secondary school business education teacher.

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INTRODUCTION

Ann M. Milne

The 1980s were characterized by waves of reform efforts in education in general, and some efforts in vocational education in particular. These waves were in response to a number of factors, including reports written by education policy pundits, an increasing involvement of the state governors in the education field, and a perception that the United States was falling behind other developed nations economically. The first wave of reforms in the early 1980s was a strengthening of standards--increases in the length of the school day or year, increases in the number of required academic core classes, higher standards for entry into teaching--that were inherently inimical to vocational education. As vocational classes were electives, they were often squeezed out in the emphasis on greater numbers of academic credits. Thus, in the eyes of many, vocational and technical education had no role to play in educational reform.

However, there were other reform efforts taking place, particularly during the latter half of the 1980s, that envisioned more of a role for vocational education. One of these approaches was an interest in contextual education, in which the everyday context in which skills are used grounds the teaching of those skills. A second approach is a focus on the integration of academic and vocational skills into a single course of learning. Yet another approach that holds promise for the reform of education is the new focus on tech prep or 2 + 2 programs. Each of these approaches offers educational enhancements that not only call for the inclusion of vocational and technical education in reform efforts but that promise to enhance and enrich such education. Efforts in these areas are more or less encompassing and vary from reforms in individual classes to school-wide changes. These are the reform areas discussed in the papers in this volume.

The first paper, by Asche, Elson, Echols and Williams (Chapter 1), discusses four recent reform efforts, and uses data from the National Assessment of Vocational Education (NAVE) to assess the current implementation of these reforms. The first two of these reforms are considered to be "first wave" reforms, and encompass the strategies of national goals, testing and accountability and of teacher education and certification. The second two reforms relate to the second wave of reforms, often referred to as "restructuring" of schools, and include the areas of school choice and site-based management.

As the authors note, there have been a number of concerns raised about the ability of first-wave reforms, calling for simply more of the same from the schools, to effectively raise achievement. In particular there have been

questions raised about the increases in achievement testing itself with traditional norm-referenced tests, and the tendency to use such tests to track students. Such tests may also lead to fragmentation of the curriculum and to a focus on basic rather than higher-order skills.

With respect to teacher certification reforms, these efforts have often not taken into account the differing requirements for vocational teachers, who frequently are selected for their skill in a trade area rather than on the basis of baccalaureate degrees. Many reform proposals have called for alternative credentialling systems that require less formal teacher education. Whatever the approach, teacher quality is deemed to be a requirement underlying any reform, but the definition of such quality is still uncertain.

The option of parents to choose schools is not a new idea, but it has been more seriously proposed and attempted in the last decade. Advocates offer a number of reasons for school choice, not least among them equality of opportunity. It is also assumed that competition among schools would lead to increased efficiency. Critics point to potential problems such as creaming of better students and teachers and the promotion of strong schools rather than the nurturing of weak ones. The authors discuss the available data on the effectiveness of choice options studied to date.

Site based management is an effort to return control of the schools to the most local level. The efforts here are to increase efficiency and accountability, and to empower local educators and parents. Beyond this it is assumed that local school management will bring about new relationships among teachers, administrators, parents and students.

The authors use NAVE data collected during 1992 to analyze the degree of action taken by states and districts in each of these reform areas. Within the area of accountability or quantitative reforms they find that large numbers of states and districts report increased academic credits required for graduation or for entry into postsecondary education, but fewer report mandates for longer school days or longer school years. With respect to reforms that embrace restructuring, the authors discuss the data on the integration of vocational and academic curricula, on local control and responsibility, on articulation between secondary and postsecondary vocational education, and on institutional integration.

In her paper, Karweit (Chapter 2) discusses the concept of contextual learning as a renewed movement for integration of skills and their context based on cognitive science. This approach calls into question the ideas of a skill hierarchy and the generalizability of basic skills. In particular, questions are raised about the ability of individuals to learn abstract skills divorced from the contexts in which the skills are to be used. This viewpoint sees cognition as situated and specific rather than a abstract and generalizable. What is needed,

it is believed, is attention to context, to situation and to real-life applications. The theoretical basis for contextual learning is laid out, and the literature relating to it is examined.

An important distinction made with respect to contextual learning is that of learning that occurs out of school as opposed to that within school. It is noted that many students are able to perform tasks out of school that they cannot perform within school. There are a number of differences drawn between the two situations, such as the reward structure and the collaborative nature of real world learning. The ability to transfer skills from a learning situation is discussed, and the controversy over whether such transfer actually takes place with respect to any but very simple skills is noted. This leads to a criticism of teaching in schools as too abstract and divorced from the context in which it is to be used.

The author discusses a number of specific studies that have been conducted around contextual learning. The studies involve tasks that are challenging and authentic. One approach is anchored instruction, which situates instruction into the context of meaningful problem solving environments. Many of these situations present problems on videodisc as the anchor. A second approach goes under the heading of functional context education, where instruction is made meaningful by relating it to existing knowledge, and real life examples are used like those the student will encounter after training. A third approach is reciprocal teaching where the teacher models expert practice for the student. Research studies are described in each of these areas, and the adequacy of the research methodology is discussed. The three approaches are then mapped against the ideal learning situation. The author concludes with two policy concerns: that the fledgling contextual learning movement be given greater national recognition, and that the research data base be expanded.

The final three papers in the volume deal specifically with reforms that have taken place within vocational education proper. Two of these papers deal with the integration of academic and vocational education and the third deals with tech prep or 2 + 2 programs. In the first paper dealing with integration, Stasz, Kaganoff and Eden (Chapter 3) review the literature relating to integration. The authors quote from the Perkins Act of 1990 the language that requires integration, but note that neither the law nor the regulations have been very specific about just what constitutes integration. There is language requiring coherent sequences of courses and the goal of students achieving both academic and occupational competencies, but little further guidance on implementation.

The authors note that much of the literature on integration deals with planning and implementation of integration rather than with outcomes, as integrated programs can take many years to design and implement. They note that audiences and constituencies expect integration to accomplish a number of

goals, including: the improvement of both academic and vocational curricula; making the United States more competitive worldwide; giving job entrants basic and generic workplace skills; encouraging academic and vocational teachers to share their respective teaching methods; and enhancing equity in the distribution of academic and vocational learning.

The authors begin by discussing integration within secondary schools. From the literature it is clear that the most common way to integrate programs involves the adoption of applied academics courses either by buying off-the-shelf materials or developing programs locally. The most common subjects integrated in this way are math and science. A second approach is to assign equivalent credit, that is, to give academic credit for vocational courses without changing the curriculum. Borrowing from the literature, the authors list eight models of integration which can be briefly summarized as follows:

- incorporating more academic content in vocational courses;
- combining academic and vocational teachers to incorporate academic content into vocational programs;
- making academic courses more vocationally relevant;
- curricular alignment;
- senior year projects;
- the academy model (school within a school);
- occupational high schools and magnet schools;
- occupational clusters, career paths and occupational majors.

Integration at the postsecondary level is much less common, and the dominant efforts seem to be the use of general education requirements and of applied academics courses. However, the authors list the eight types of program integration seen at the postsecondary level and compare these approaches with those at the secondary level.

The authors go on to list a number of positive outcomes that are listed in the literature, including increased collaboration between vocational and academic teachers, a shift away from teaching specific facts and procedures to teaching generic skills, integration of vocational and academic students, changes in organizational structure, and improved student achievement. Some negative outcomes are listed, including primarily changes in teachers' responsibilities. The authors conclude with sections discussing the evaluation of integration programs, and implementation barriers and supports.

The second paper on integration, by Grubb and Stasz (Chapter 4), looks at progress in integration under the Perkins Amendments of 1990 as determined by analysis of NAVE data. They begin by looking at data for secondary education. Starting with responses from state-level administrators, they find support for the concept of education integration, particularly among vocational administrators.

Turning to secondary district responses they find that district interest in activities related to integration is high and increasing; that integration activities are more likely in larger districts, in districts with a high proportion of their resources from Perkins funds, and in those with high proportions of Chapter 1 students and vocational students. Turning to secondary schools themselves, they list a number of conclusions including the fact that there is not much collaboration between academic and vocational teachers; that there is a tendency toward more integration in schools where there is strong support for vocational education; that integration is more common in schools with higher proportions of minority students; and that state support for integration enhances school-level activities.

Turning to postsecondary education, the authors conclude that there is increasing state interest in integration but that such activities are less common than at the secondary level; also, states with high proportions of their vocational resources coming from Perkins funds, and those with high proportions of such funds at the postsecondary level, are more likely to engage in postsecondary integration efforts. Turning to postsecondary institutions, they conclude that there is little regular.collaboration of academic and occupational faculty; large institutions, and those with higher spending per student, are more likely to engage in certain integration activities; and Perkins funds are important in stimulating integration, as is state activity. The authors conclude with recommendations for further study.

The final paper, by Hayward, Dornsife, Bragg, Hoerner and Clowes (Chapter 5), is a literature review of tech-prep programs. These are articulated 2 + 2 programs that begin in the last two years of high school, are completed after two years of postsecondary training, and lead to an associate degree in such fields as business, health, engineering, etc. These programs are supported by the federal government through the Tech-Prep Education Act of 1990 (part of the 1990 Perkins Act), specifically by grants to consortia of secondary districts and postsecondary institutions. The authors begin with a description of the economic and educational context for tech prep, and with a discussion of the essential features of tech prep.

As relatively new efforts, tech-prep programs are at an early stage of development. The authors identify five key definitional components of tech prep-programs which include articulation, integration of academic and vocational education, connection between school and work, development of core curriculum and course sequencing, and emphasis on learner outcomes. To date most programs are only at the simplest stage on each of these facets.

Looking at stages of development, the authors list four areas--information/marketing campaigns, curriculum development, career guidance and program evaluation. They find that consortia are still in the early states of development in each area. For example, on the dimension of information and

marketing campaigns, consortia generally were moving from the beginning to the intermediate stages. This is also true of curriculum development. Consortia have done little to develop strong programs with industry and even fewer have adopted significant evaluation measures.

The authors note that these results are what would be expected of a relatively new program, and one in which Congress emphasized technical assistance so programs could be built on a strong base. The authors conclude with answers to a number of questions that policy makers might ask about the implementation of tech-prep programs.

CHAPTER 1

THE IMPACT OF EDUCATIONAL REFORM ON VOCATIONAL EDUCATION

Marion Asche, Donald E. Elson, Ann Echols, and Arthur Williams

1. INTRODUCTION AND BACKGROUND

Beginning with the issuance of A Nation at Risk[1] in 1983, the decade of the 1980s has been a period of intense focus on America's public schools. While this past decade may be characterized as one of intense activity, cries for reform of public education are not new. Vocational education has been a catalyst for and a participant in the reform of public education since the earliest years of American public education. Within this historical context, the present review focuses on the major educational reforms which have been proposed during the past decade and, to the extent possible, relates changes in vocational education to the major themes of reform during that period.

A dramatic early reform of American education was advocated by the original legislation which provided federal support and encouragement for the addition of vocational education to the "bookish" curriculum of the early 1900s. The Smith-Hughes act of 1917 was significant not only for its obvious effect of adding practical subjects to the curriculum, but also for setting the precedent of federal involvement in secondary level public education, for the recognition of public education's responsibility to the general population, not just a selected minority, and for legitimizing the advisory role of business and industry in determining the "vocational aspects" of public education. At this point in the Nation's educational history, vocational education was viewed as a major strategy and mechanism for reform of all public education. Lazerson and Grubb[2] described the thorough transformation of America's schools in the four decades surrounding 1900--"no development was more critical to this reconstruction than vocational education."

Over the years, since the rapid expansion and development of public education of the early 1900s, successive waves of reform have had varying levels of impact on the scope and nature of schooling. Notable among these have been the refocusing of effort on science and mathematics after Sputnik, the community college movement, the increased attention to the needs of special populations and individuals with disabilities, and more recently, reforms which reflect growing concern for global economic competitiveness, productivity, and preparation of American workers for new forms of workplace organization and technological sophistication.

Even a cursory review of vocational education policy, as expressed in federal legislation during these same periods, reveals parallels to the more general reforms. Noteworthy is the expansion of occupational areas and populations served during the 1930s through the 1950s promoted by the George-Deen Act of 1936, the George-Barden Act of 1946, and the Health Amendments Act of 1956. The increased concern for postsecondary technical education and technical occupations which followed Sputnik was evident in the National Defense Education Act's emphasis on technical education and area vocational schools. The redirection of vocational education by the 1963 Act and 1968 Amendments toward redressing social and economic inequities for individuals paralleled growing national concern in these areas.[3] During the 1970s, career education was seen by many as an attempt to refocus all of education around a career development theme. Grubb and Lazerson[4] stated, "The goals of career education have thereby become a catalogue of all-purpose educational reforms."

Purpose of the Review

The variety and intensity of proposals for educational reform accelerated dramatically during the 1980s. Many of the proposals for reform and/or restructuring of education during this period have cited as a primary rationale slipping productivity and a general failure of the schools to provide graduates who compare favorably with those of our international competition. Bailey[5] states, "Since the early 1980's, educational reform has become closely tied to perceived problems in the relationship between education and the country's competitiveness." He says that A Nation at Risk and many other reports during this period at least implied that much of the blame for the decline in U.S. international economic dominance could be attributed to the failure of the public schools. America 2000, An Education Strategy[6] states, "Yet while we spend as much per student as almost any country in the world, American students are at or near the back of the pack in international comparisons." The National Center on Education and the Economy[7] states, "No nation has produced a highly qualified technical workforce without first providing its workers with a strong general education. But our children rank at the bottom on most international tests--behind children in Europe and East Asia, even behind children in some newly industrialized countries."

Most of the recent proposals for reform of education have dealt primarily with academic skills and have not focused specifically on vocational and technical education. Hoyt,[8] in discussing educational reform and relationships between education and the private sector, states that "First, every education reform proposal of the 1980s was rooted in the need to increase America's ability to compete in the international marketplace. Yet none emphasized a 'careers oriented' approach to reform." The Carl D. Perkins Vocational and Applied Technology Education Act Amendments of 1990 (Perkins II), while not

specifically referencing recent reform initiatives, encompasses changes which are compatible with, if not the direct result of, major reform proposals.

Changes in contemporary vocational and technical education, and especially those promoted by Perkins II, are thus taking place in a more general climate of educational reform. As states and localities work to implement the provisions of Perkins II, they are necessarily doing so in this reform environment. The primary purposes of this review are to examine in some detail the major reforms of the 1980s and early 1990s, assess the types of changes taking place in vocational and technical education and, to the extent possible, examine these two phenomena for possible areas of compatibility and conflict. The underlying assumption is that vocational and technical education, while not assigned a major role by many of the recent reform proposals, is just as important to the success of educational reform today as it was in the early 1900s. It is also proposed that optimal implementation of the letter and intent of the Perkins II legislation is dependent on a general understanding of the major tenets of education reform by the vocational education community.

Context of Reform During the 1980s

At any given point in American history, public education has been called upon to address not just educational problems, but also the social, economic, and political problems of society. The current period is no exception. Conditions calling for educational reform (or at least those which tend to garner public attention) are often external to the process of schooling itself. Slipping workplace productivity, inability to compete in the international arena, drugs, crime, teen pregnancy, racial and economic inequity and other problems are cited as evidence that public education should change.

Employers who sit on many of the commissions and committees formed to examine education claim that the modern workplace calls for different and higher level skills than are currently possessed by the graduates of the Nation's public secondary and postsecondary schools. The Secretary's Commission on Achieving Necessary Skills (SCANS) in its publication Learning a Living[9] states, "Many young people between the ages of 16 to 25 today are frustrated because their high schools talked of English and geometry, but their workplace speaks a different language" and continues, "But in the emerging high- performance workplace virtually everyone acts as a decision maker, gathers and sifts information, sets up and troubleshoots systems, organizes workflow and team arrangements, manipulates data to solve problems, and, on occasion, provides directions to colleagues." The National Center on Education and the Economy,[10] on the other hand, found that only five percent of employers surveyed were concerned about a skills shortage, and rather cited the need for workers with a good work ethic and appropriate social behavior. They also found that most employers who were interviewed did not expect their skills requirements to change.

A causal link between the quality or nature of education and societal problems is often implied if not stated. To "fix" education implies a resulting solution of the external problem. Public education is thus at once both the source of problems and the source of solutions to those problems. This instrumental view of education is widely accepted by the public, making the goals of education highly political in nature. It is unusual to reverse the causal equation and attribute school problems to problems in the wider society although Carr[11] states, "The problems of America's schools stem in large part from causes deep in the national experience: urban blight, drugs, the erosion of the family, and long-standing failure to direct sufficient resources to the schools. In the face of these pressures, the schools have been called upon to take over the roles formerly played by the family, churches, and other agencies, ranging from sex education to housing and feeding children from dawn to dusk, well beyond school hours."

Much of current reform rhetoric adopts an instrumental view and advocates solution of economic, social and political problems through more effective or efficient use of the education "tool." A relevant example is the stated purpose of Perkins II "to make the United States more competitive in the world economy by developing more fully the academic and occupational skill of all segments of the population." (Section 2)

The political climate of the early 1980s dictated declining federal educational support and devolution of federal authority. Goertz[12] captures the changing environment of education politics in the following passage:

> Twenty years ago, education was just reaching the end of a quarter century of rapid growth .... Today, the school-aged population is smaller, poorer and more racially and ethnically diverse. Declining test scores throughout the 1970s undermined public confidence in the country's public school system and led business leaders to question the quality of the nation's future workforce. An eroding U.S. position in the international economy turned policy maker's attention and energies to issues of efficiency, choice and excellence in education and away from earlier concerns with equity. Policy leadership thrust upon the federal government by the Russian Sputnik launching and the Supreme Court's desegregation rulings has shifted back to the states where fragmented and diffuse interest groups compete for control of the education agenda.

This political vacuum was described by Goertz as providing the ideal climate for federal advocacy of the instrumental view of reform. This was also the ideal climate for state governors, as politicians, to assume reform leadership positions. The economic problems of poverty, unemployment, productivity and international competitiveness were, under this scenario, to be addressed through raising educational standards and efficiency. The previous concerns for equity, multiculturalism and urban blight were translated into concerns for

excellence, selectivity, minimum standards and increased emphasis on academics.[13] Bailey[14] states, "Earlier, through the mid-1980's, educators had been primarily concerned with problems of equity and access to education. By the middle of the 1980's, the focus on equity and access had been weakened so much that the drive for equal access was often seen as part of the problem rather than the primary objective of reform."

Whether the dominant concern is excellence or equity, the instrumentalist view translates social and economic problems into school problems then takes either a "conservative" (competition, choice, standards) approach or a "liberal" (increased targeted funding, regulation, intervention, enforcement) approach to solving the problems.

The 1980s Focus on Education

Vocational educators can cite ways in which vocational education participated in or was affected by earlier reforms of revitalization of science and math, "back to basics," programs for gifted and talented individuals, the increased legislative and judicial focus on the special needs of persons who are academically or economically disadvantaged and persons with disabilities, as well as an increased attention to equity in relation to race and gender. The reforms of the 1980s, however, have been unique in intensity, variety of approaches to reform, and in the fact that they have led to calls for changing the very structure of public education. While not a specific focus of any of the most publicized reform proposals, vocational education has nonetheless begun to feel the effects of the early calls for increased emphasis on academics, increased "seat time," increased graduation standards for students, and changed certification standards for teachers. It can be hypothesized that proposals offered in the later 1980s (generally labeled "restructuring"), if implemented on a large scale, could have an even more profound effect on the field.

Today's schools are besieged by a swarm of overlapping, often uncoordinated, and sometimes contradictory reform efforts. Chance[15] found that between the early and mid 1980s over 275 education task forces had been organized in the U.S. The outcomes at that point, according to Chance's study, included higher standards for graduation from high school in 43 states, higher college admissions standards in 17 states, statewide student assessment programs in 37 states, teacher competency tests in 29 states, and changes in teacher certification requirements in 28 states. A recent survey of 50 state education agencies and the District of Columbia found that 45 states have developed reform/improvement efforts focused on high schools within the last five years.[16] This same survey revealed that 27 of the states had increased the requirements for both science and math, and that 40 states reported having a state-mandated testing program that all students must take. Timar and Kirp[17] note that "Since 1983 the states have generated more rules and regulations

about all aspects of education than in the previous 20 years. Nationwide, more than 700 state statutes affecting some aspect of the teaching profession were enacted between 1984 and 1986." Price[18] states "New criticisms were leveled at schools, and proposed cures cropped up before earlier ones could be absorbed, much less implemented." Even though most commission reports and proposed reforms have focused on "academic" education, it would be very naive to assume that vocational education has not or will not be affected.

Waves of Reform

Different authors have tried to make sense out of the rapidly evolving reform scene by describing unique "waves" of reform. Michaels[19] discussed two waves of reform, the first concerned with raising standards, increasing accountability, length of school days and years and the general elevation of the rigor of American public education. He states that the second wave (beginning about 1988) is characterized by a markedly different agenda, including: (a) the school as the unit of decision making, (b) development of a collegial, participatory environment among both students and staff, (c) flexible use of time, (d) increased personalization of the school environment with a concurrent atmosphere of trust, high expectations, and a sense of fairness, (e) a curriculum that focuses on students' understanding what they learn - knowing "why" as well as "how", and (f) an emphasis on higher-order thinking skills for all students. Bailey[20] describes the first of two basic periods of reform during the 1980s as quantitative (increasing academic requirements and standards). He states that this strategy began to give way to three broad groups of strategies during the latter 1980s: content strategies (e.g., integration of academic and vocational, reducing distinctions between learning in school and nonschool settings, contextual and applied learning), organizational or procedural issues (e.g., school choice, school-based management), and establishing institutional relationships between schools and outside organizations (e.g., Tech Prep, Business Compacts, customized training).

Futrell's[21] characterization of the first wave of reform parallels that of Michaels with a view of education as an instrumentality to serve national interests and an emphasis on "more"-- more tests for students and teachers, more credits for graduation, more hours in the school day, more days in the school year, more regimentation, more routinization, more regulation. Even though Futrell describes four waves, she emphasizes the same two trends (increasing rigor and restructuring) that are used by other authors such as Michaels,[22] Mirman,[23] and David, et al., [24] to summarize the many reform proposals.

Mirman[25] characterizes the early years of the decade as the first wave of reform and states that it concentrated on efforts to improve on what was already being done. She characterizes the second wave as attacking the very structure of education, focusing on whom we teach, who teaches, what we

teach and how we teach. The term, "restructuring," began to appear in the literature about 1987 to characterize the second wave of reforms. David, et al.[26] states, "Restructuring represents a very different approach to reform. It is a systematic approach that acknowledges the complexity of fundamentally changing the way schools are organized in order to significantly increase student learning." A review of the "waves" of reform during the 1980s indicates that the dominant focus shifted from demanding or legislating "how much" -- primarily increases in what was already being done, to experimentation and application of numerous strategies designed to achieve desired changes or "how" it should be done. The SCANS[27] report states "The educational reforms of the 1980s demonstrated that it is futile to try to wring high performance from schools by doing more of the same--more tests, more classes, and more time, thus playing the old school game with more of the old rules."

2. PRIMARY STRATEGIES OF REFORM

Several strategies or approaches to reform emerge as dominant in the proposals of the past decade. While strategies are often interrelated, four major approaches are independently considered in this chapter: (a) national goals, testing, and accountability; (b) teacher education and certification; (c) school or parental choice; and (d) site/school based management. National goals, testing and accountability, as well as teacher education and certification, are often considered to be parts of the overall "excellence" movement of early or "first wave" reform proposals. School or parental choice, and site-based management are often associated with the second-wave or "restructuring" phase of the 1980s proposals (although school choice in one form or another actually predates the 80s decade).

The literature of reform focuses on those strategies which have been proposed for education in general. Some early reports, however, advocated elimination of secondary school vocational education,[28] elimination of vocational education as a separate track and doing away with the job training rationale,[29,30] placing vocational education outside the required core of subjects,[31] or simply not dealing with vocational education.[32,33] Vocational practitioners, however, are aware that change is underway in vocational education. It is not possible to attribute causally specific changes in vocational education to general education reforms, nor, in all cases, to draw parallels between changes in federal legislation for vocational education and the more general education reform strategies. Still, the basic strategies of reform which have been advocated during the 1980s provide a useful organizational framework for examining change in vocational education.

National Goals, Testing and Accountability

The earliest stages of the 1980s reform movements focused on raising standards and making schools and educators more accountable for results. Findings of a five-year study conducted by the Center for Policy Research indicated that "The highest level of state activity was in mandating more academic courses and upgrading teaching through changes in certification and compensation--student testing requirements also increased".[34] An example of one proposal was for American Achievement Tests: "In conjunction with the National Education Goals Panel, a new (voluntary) nationwide examination system will be developed, based on the five core subjects, tied to the New World Standards."[35] The 24th Annual Gallup/Phi Delta Kappa Poll of the Public's Attitudes Toward the Public Schools found that 71% of the respondents supported required national testing to measure student academic achievement. Further, of those who favored required national tests, 81% approved of their use to rank schools, and 90% favored their use to identify areas where teachers need to improve their teaching skills.[36]

As stated earlier, the actions taken as a result of numerous task forces and commissions during the first half of the decade were primarily directed at raising academic rigor and graduation requirements, raising certification standards for teachers, developing various merit and choice systems, and imposing standardized testing for both teacher certification and student progress (see national surveys by Chance[37] and by Webster and McMillin.[38]

Another aspect of what might be viewed as a national accountability system for education is the setting of national goals for education. This was the purpose of the meeting of Governors at Charlottesville in 1989, called the "Education Summit." The testing and accountability momentum derives at least partially from the desire to measure and monitor states' progress toward achievement of the national goals established at the Charlottesville meeting. The same respondents that were supportive of national tests in the 24th Annual Gallup Poll, however, indicated a very low level of awareness of the national goals the tests were to be designed to facilitate (less than 30% responded that they were aware of any given goal.

The potential effectiveness of raising educational standards, increasing testing, and insuring accountability for outcomes is yet to be assessed. While there appears to be considerable support for the concept of accountability through standards and measurement, the technical problems of system development and assessment are the focus of considerable concern. Many measurement authorities, as well as school practitioners, are concerned about the ability of standardized measures commonly available to measure the desired outcomes with an acceptable degree of validity and precision. Darling-Hammond[39] criticizes traditional American norm-referenced, multiple-choice tests as being designed to make tracking and sorting of students more efficient, versus

supporting or enhancing instruction. Additionally, there is continuing concern that such objective tests have typically tended to drive the curriculum even more toward fragmented learning and lower order skills that are more easily taught and assessed. Darling-Hammond[40] notes,

> National data demonstrate that, when state policy makers began to institute test-oriented accountability measures in American schools, the use of teaching methods appropriate to the teaching of higher-order skills decreased. Between 1972 and 1980, public schools showed a decline in the use of such methods as student-centered discussions, the writing of essays or themes, and projects or laboratory work.

She cites as evidence, "achievement trends which reveal that since about 1970, basic skills test scores have been increasing while scores on higher order thinking have been steadily declining in virtually all subject areas."[41] Using a national examination to insure institutional accountability requires that the test have strong links to the curriculum, thus, an agreed upon national curriculum - a condition not unusual in other countries but highly unlikely in the Unites States. Smith cites as one major reason for the failure of the nation's present system of accountability "the lack of continuity between the tests being used and the content of the curriculum the students are being taught.[42]

Teacher Certification and Preparation

The reform of teacher education was one of the prominent goals of early 1980's reforms. Beginning with publication of A Nation at Risk, which focused on teachers as both the cause of and the solution to the nation's educational ills,[43] a succession of proposals addressed the "teacher problem." Included were proposals for increasing the rigor of teacher education, increasing clinical experience, providing alternative routes to certification, imposing stricter certification requirements, higher teacher education entrance standards, and more rigorous evaluation and testing of teachers.[44] Webster and McMillin[45] found that 44 states had upgraded teacher certification requirements in the previous five years and 34 had upgraded the teacher evaluation process in the same period. This attention was not focused specifically on vocational teacher quality, but vocational teacher certification and preparation have, to some extent, become subject to the same reform prescriptions. Little[46] notes:

> The discoveries of the past decade regarding school context, teachers' professional development, and teachers' career commitment are derived nearly exclusively from teachers in the core academic curriculum or obscure intraschool (between academic and vocational) differences. Vocational teachers have remained nearly invisible in the mainstream literature on high schools, despite the considerable attention devoted to the problems and prospects of a vocational curriculum.

While there is continuing debate as to whether these proposals for changes in teacher preparation and certification properly address any extant teacher supply or quality problems, there is general agreement that the success or failure of most proposed education reforms is dependent on the availability of quality teachers. Darling-Hammond[47] stated, "The supply of qualified teachers, the nature of the preparation they receive, and the extent to which their talents are available to schoolchildren in different communities are the critical factors that will make or break education reform efforts across the country." Altbach[48] stated, "Without a qualified, committed, and motivated teaching profession, there can be no quality education."

Vocational education has held, historically, two different views of how secondary school level vocational teachers should be prepared. Trade and craft programs, which are commonly classified under the program label of Trade and Industrial Education (T&I), have traditionally placed dominant emphasis on trade experience rather than the four-year teacher education program. As a consequence, the typical certification requirements for T&I teachers do not require the baccalaureate degree.[49] Other vocational program areas such as agricultural education, business education, marketing education, technology education (industrial arts), and home economics education, while requiring relevant occupational experience as an important aspect of certification, require the 4-year degree for beginning level certification. The various proposals for reform of teacher education thus may affect these two dominant approaches quite differently.

Two issues are prominent in the literature on teacher certification and preparation -- teacher supply and teacher quality. A parallel issue which has received less attention is teacher distribution, both across disciplines and geographic areas. Kennedy[50] proposes three problem areas: (a) the problem of representation-- how to get persons into teaching who better represent the population of students being taught; (b) the problem of tested ability--how to ensure that teachers are of the intellectual caliber we desire; and (c) the problem of improving practice--even if the first two problems are resolved, how can teachers' classroom practice be improved? Problems of quality, representation, supply, and distribution, however, are not independent. Reforms addressing one problem area will, in all likelihood, affect the other areas.

Before addressing issues of teacher quality, supply, or representativeness, however, a first step should be to define what is meant by "good" teaching or teachers. Proposed reforms have not been explicit about how they define teaching, although those which minimize pedagogical and psychological preparation appear to be based on a definition of teaching as primarily knowledge dissemination. Goodlad[51] claims that the "technocratization of teaching appeared to be reaching epidemic proportions by 1985 and seemed to

offer the promise of generic teaching models that offered quick instructional fixes."

Reform proposals for alternative certification and reduced formal teacher education appear to assume the technical view of teaching. These reforms typically require new teachers to acquire undergraduate degrees in a subject matter discipline with "teacher education" (courses in pedagogy, student-teaching or teaching internships) postponed to post-baccalaureate programs or limited to a set number of hours within the undergraduate program. Most alternative certification plans also provide for entry to teaching by existing graduates of academic programs through minimal "add on" teacher training coursework or field experiences. These approaches seem to be most compatible with the technical definition of "good" teachers. In contrast, Fenstermacher[52] states that the goal of teacher education is not to indoctrinate or train future teachers to do things in prescribed ways (i.e. Goodlad's "generic teaching models"). Rather, the goal is to educate students so they can perform skillfully and reason soundly about their teaching. If one views teachers in the more complex fashion as proposed by Fenstermacher, teacher education reform would necessarily go well beyond simply insuring subject matter competence. In vocational education, both views of teaching appear to coexist although competency based teacher education curricula have tended to dominate.[53] Proposals addressing teacher education reform appear to focus on teacher quality and supply issues without defining quality beyond the implied definition of subject matter competence.

The dominant approach to insuring that teachers are of appropriate intellectual caliber has been to mandate some type of teacher assessment in most state's certification standards. According to Chance,[54] 29 states had implemented teacher competency tests by the mid 1980s. The Webster and McMillin[55] survey found that 38 states had in place an examination of basic education and skills as part of the teacher certification process. Kennedy[56] points out that not only is the nation's teaching force so large that it would be impossible to fill vacancies from the uppermost range of intellectual ability, but also that it is also not clear that existing tests actually measure behavior relevant to teaching performance. Kennedy claims that most states have designed their assessments so that very few teachers have failed; consequently, such systems have not contributed to raising standards for entry. Systems of teacher evaluation have also not proven to be effective as currently used. Glickman[57] states: "Uniform systems of teacher evaluation have cost millions of dollars and millions of hours -- and for what? to rid the profession of fewer than two percent of our teachers." Glickman points out that teacher evaluation may be a necessary control function of an organization but that it is only effective in improving a school when the majority of persons evaluated border on incompetence.

Alternative certification has been proposed[58],[59] as a reform which will both resolve the teacher supply problem and raise the intellectual caliber of new teachers. This approach appears to be based on two assumptions. First, one may assume that the reason more (and brighter) people don't enter teaching is that present certification standards and teacher education programs serve as a barrier to these individuals. Second, alternative certification at least implies that present teacher education programs do not have the necessary rigor or entrance requirements to screen out persons of lesser ability. Altbach[60] counters this view by citing a study conducted at the State University of New York at Buffalo indicating that persons in the teacher education program are above average for the university as a whole. Haberman[61] states that a primary reason for growth of alternative certification programs is that too few traditionally prepared teachers enter teaching, citing Wisconsin and Minnesota as evidence where 70% and 68%, respectively, of new teacher education graduates do not take teaching jobs.

The alternative certification approach has been used to provide emergency certification in periods of teacher shortage, particularly shortages in certain academic or geographic areas. However, reasons for offering alternative certification are becoming more diverse. Roth[62] states that a 1986 survey revealed that 20 states had alternative certification programs established through state policy and that an additional 11 states had such programs pending. Some states have gone so far as to provide for alternative certification while specifically limiting teacher preparation. Parker[63] reports 11 states with high caliber (Class A) alternative certification, eight others with alternative certification in certain areas, 39 states that are developing alternative certification programs, and 16 states and the District of Columbia who waive certification by allowing individuals to teach unsupervised while they take teacher education courses. Parker states that from 1985 to 1988, 20,000 alternatively certified teachers were licensed, with an additional 12,000 entering teaching through alternative certification during 1988 - 1991.

There has been a tendency among reform advocates to assume that "teacher education" is synonymous with "colleges of education." This simplifies the problem of teacher education reform -- reform the colleges of education or do away with them. Goodlad[64] states "My fear is that large numbers of people will continue to equate these institutions with teacher education and assume erroneously that drastic action directed against them will automatically take care of the problems of teacher education." There seems to be little awareness that colleges of education typically do not provide the majority of the candidate's academic experience. Particularly in the case of secondary teachers, almost all of the student's academic program is made up of courses from other appropriate academic colleges and departments. The aspiring math teacher receives instruction in mathematics in the math department, not from the college of education. Requiring new teachers to have undergraduate degrees in the subject discipline will probably have little effect on what

discipline-related courses are included in the teacher education curriculum. Rather, such requirements will change who has institutional control over teacher education. This may work against providing the clear sense of mission and coherent governance structure deemed necessary by the National Council for Accreditation of Teacher Education (NCATE Standards on Governance and Resources) and found to be important by recent research on teacher education. Goodlad found in the Study of the Education of Educators (SEE) that in the regional and state universities included in the sample, teacher education typically had low prestige and low status, had an unclear mission and identity with accompanying lack of "protected" budgets, considerable faculty disquietude, an ill-defined student body, and a lack of program coherence. How these problems can be addressed by current recommended reforms is unclear.

The problem of attaining a teaching force which roughly approximates the racial and gender makeup of the population of students to be served is confounded with the "tested-ability" problem. This problem may be exacerbated by raising standards for entrance to teaching. Increased testing of teachers and raising of entrance standards have, in fact, contributed to the shortage of minority teachers.[65] These shortages, coupled with increased access by minorities to jobs which are typically of higher status and pay and the rapidly growing minority population of students, tend to increase the imbalance. Haberman [66] suggests that alternative certification offers one partial solution in that although only about five percent of traditionally trained teachers are Black, 58 percent of the alternative teachers of Texas are members of minorities. The gender imbalance problem could, at least theoretically, be helped through greater access by females to occupations which have traditionally been male dominated.[67] This would only be the case, however, if males were available to replace the departing females in the teaching force.

The racial/ethnic and gender composition of the present population of vocational teacher-educators (sample limited to those who are involved in undergraduate teacher preparation) was investigated by Lynch. Lynch[68] found the vocational teacher education professorate to be 71% male and 91% white with approximately six percent black and three percent other minorities. The National Center for Education Statistics in Vocational Education in the United States: 1969-1990[69] reports that for secondary level vocational teachers, 53.6 % were male and 46.4% were female and 87.5% were white (non-Hispanic), 8.2% were Black (non-Hispanic), 2.2% were Hispanic, 0.7% were Asian, and 1.4% were Native American. At the postsecondary level (Fall, 1987), 64.6% of vocational faculty were male, 90.7% were white (non-hispanic), 3.3% Black (non-Hispanic), 3.7% Hispanic, 1.3% Asian, and 1.0% Native American.

As stated earlier, vocational education has traditionally operated with two dominant models for preparing/certifying teachers. Anecdotal evidence

suggests that university level departments and divisions of vocational education have suffered continuing cutbacks over the past several years with several being eliminated as administrative units. The most recent federal legislation, Perkins II, changes the intrastate funding formula to distribute a greater proportion of federal funds directly to school districts resulting in reduction of funding to many of the university and college-based vocational teacher education programs.

School Choice

School choice, or parental choice as it is often called, is not a new idea. It is, however, an idea which has moved to the top of the school reform national agenda.[69] Brogan[70] notes that "Adam Smith in The Wealth of Nations *(1776)* recommended that money be given by the government to parents for the purpose of buying educational services." Milton Friedman in 1962 advocated educational vouchers as a way to foster diversity and equalize opportunity. Magnet and specialty schools were formed to contribute to voluntary desegregation and to improve public education beginning in the 1960s. The Reagan administration advocated vouchers in relation to Chapter 1 programs. More recent advocacy of school choice by prominent individuals such as Finn[71] and Chubb and Moe[72] has elevated this strategy to a dominant position in debate on school reform. The Carnegie Foundation for the Advancement of Teaching in the report School Choice reports that in less than five years, 13 states have established choice plans, that a dozen other states are debating such policies and that scores of individual districts have introduced a variety of school choice plans.[73]

Advocates of choice tend to argue that general school improvement will result from free market competition. Choice may help lead to equity since only families with adequate resources can now exercise choice through living in the "right" neighborhood or by paying tuition to private schools, and to efficiency through breaking down large central school bureaucracies. Accusations by choice advocates of inequity, inefficiency and lack of quality in the present dominant approach to providing public education are not unlike the concerns of persons who are opposed to choice as a strategy of reform. Those opposed to choice question its ability to rectify these problems and cite evidence that current choice programs have even proven to be counterproductive in these areas.[74] Boyer,[75] on the other hand, states that "While school choice does not appear to be a panacea, we did find impressive evidence, especially in districtwide programs, that it can stimulate school renewal." Chubb and Moe,[76] on the other hand, state that reformers "would do well to entertain the notion that choice is a panacea."

Finn[77] states six reasons for choice: (a) the alternative is incompatible with American democracy, (b) choice fosters equality of opportunity, (c) choice helps parents play their proper roles with respect to the education of their

children, (d) choice stimulates autonomy among schools, professionalism among teachers, and good leadership on the part of principals, (e) schools of choice are more effective educational institutions (that is, students learn more in them), and (f) choice is a potent mechanism for accountability. Chubb and Moe[78] follow the same line of reasoning in stating:

> A basic premise underlying the concept of parental choice is that America's educational systems are a large part of the reason that American education is mediocre. Organized as public monopolies, America's schools and school systems have come to exhibit many of the potentially serious problems--excessive regulation, inefficient operation, and ineffective service--that are inherent in this form of organization. If these problems are to be more than temporarily alleviated, America's educational system will need to be reorganized fundamentally. Public school monopolies will need to be opened to competition, and social control over schools will need to be exercised less through politics and central regulation and more through markets and parental choice.

Bastian,[79] however, observes that the marketplace typically creates winners and losers, not all winners, as seems to be the claim of choice advocates. "It is a marketplace where consumers do not have equal buying power, reliable product information, or very much control over what gets produced. In recent years, with massive deregulation, it is a marketplace that has created immense polarizations of wealth and well-being." Bastian also lists a number of probable negative impacts of choice on equity and school governance. His equity list includes potential creaming of students and teachers, increases in informal screening and sorting mechanisms, a possible decrease in parental involvement if the school of choice is outside the residential community, erosion of civil rights mandates and desegregation plans through waivers, stressing of public relations and packaging over program innovation and substance in promoting enrollments, and increased reliance on standardized testing as a measure of student and school performance in the competitive environment. In relation to school governance, Bastian cites, as probable negative impacts, the disenfranchisement of parents from the political governance process, the possibility that significant shifting or instability of teaching staff may result in undermining reforms to increase teachers' authority over the school program, the creation of schools which are less influenced by and integrated with community life, placing of more control in the hands of state administrators and less in local schools and districts, and widening funding disparities between schools and districts with enrollment disparities. Kozol,[80] commenting in particular about Chubb's proposal for school choice, is direct in stating, "Strip away that fancy language, and we're talking about Social Darwinism, triage, and an end to all that you and I have dreamed of in the common school that binds a disparate nation into one."

While market forces or competition and empowerment are the primary rationale for choice by many supporters, Lieberman[81] points out that there are supporters who reject the competition and empowerment arguments. Weaver[82] cites one of the original designers of "controlled choice" plans, Charles Willie, as stating that the market analogy "is inappropriate in an educational situation because it ignores the social aspect of education by promoting strong schools rather than nurturing weak ones." Advantages cited by "noncompetitive" adherents include advantages of diversification and specialization of schools and motivational effects of choosing.

In research to analyze the implementation of school choice at the high school level, four large city systems were studied -- New York, Chicago, Philadelphia, and Boston. In reporting on this two year study, Moore and Davenport[83] state that the results are disturbing:

> In these school systems, school choice has, by and large, become a new improved method of student sorting, in which schools pick and choose among students. In this sorting process, Black and Hispanic students, low income students, students with low achievement, students with absence and behavior problems, handicapped students, and limited-English-proficient students have very limited opportunities to participate in popular-options high schools and programs. Rather, students at risk are disproportionately concentrated in schools where their fellow students are minority, low-income, and have a variety of learning problems. And these low-income neighborhood schools--serving the very students these urban school systems must begin to educate adequately -- characteristically exhibit low levels of expectation for their students, deplorable levels of course failure and retention in grade, and extremely low levels of graduation and basic skills achievement.

Arguments for and against various choice plans tend to focus on the same issues but arrive at different conclusions. Data are scarce that support either pro or con views. Proponents view choice as encouraging democratic reform, efficiency, equity and quality. Opponents see dangers of further segregation and inequity, erosion of the common school mission of public schooling and the subversion of substantive reform by marketing prowess. Apple,[84] for example, points out that individual choice may be a political means to take away group gains made by working people, minorities and women.

A survey of state school choice legislation[85] summarizes such legislation under six categories of school choice laws. It found that by the summer of 1991, states passing each type of law were: (a) interdistrict enrollment option laws, 13; (b) intradistrict enrollment option laws, 7; (c) post-secondary enrollment option laws, 25; (d) alternatives to public schools, 2; (e) residential

and special high schools, primarily residential programs for gifted and talented students, 10; and (f) programs for dropouts and students at-risk, 12. Fossey notes the variability in choice laws but claims that all face three basic policy issues. First, a determination must be made as to who pays the additional transportation costs; second, it must be determined how school choice plans can be implemented that minimize the possibility of interference with efforts at racial integration; and third, it must be decided who will bear the costs of educating cross-district transfer students.

The Carnegie Foundation for the Advancement of Teaching study School Choice[86] proposed three models of school choice. In-depth reviews of findings from the study of examples of each model are provided. First was the districtwide model which provides parents and students the opportunity to choose a school within their home district (classified as intradistrict by Fossey). Typically, specialty or "magnet" schools are developed under this plan. Listed as notable examples of this approach are Cambridge, Boston, Lowell, and Lawrence, Massachusetts; Monclair, New Jersey; Eugene, Oregon; Seattle, Washington; Buffalo, Rochester, and White Plains, New York; Prince Georges County, Maryland; Minneapolis and St. Paul, Minnesota; and District 4 in New York City. One approach used in many districtwide choice plans is the career magnet school, a school in which students can combine career preparation with traditional college preparation.[87]

The second classification was the statewide approach (these would fall under Fossey's interdistrict state legislation classification). Under this plan, students may attend schools outside their home district subject to variable restrictions brought about by space, desegregation, and travel. Thirteen states have adopted statewide plans and up to twenty-one others have such plans under consideration. The third approach listed by the Carnegie study is private school choice or voucher plans which allows students to attend private schools with their attendance subsidized by public funds (classified as alternatives to public schools by Fossey). At present, only Milwaukee, Wisconsin, has adopted a private school choice plan.

After a year-long comprehensive study, the Carnegie study arrived at nine conclusions which could be adequately supported by available data:

1. Americans in general feel positive about the idea of school choice. The vast majority of parents, though, appear quite satisfied with their current public school arrangements, and very few have elected to participate in statewide choice programs now in place.

2. Many parents who do decide to send their children to another school appear to do so for nonacademic reasons.

3. Not all families have multiple school options available to them, and even when options are available the choice process tends to work much better for those who are the most advantaged economically and educationally.

4. Evidence about the effectiveness of private-school choice, limited as it is, suggests that such a policy does not improve student achievement or stimulate school renewal.

5. Parents and students who do participate in school choice in both the public and private sectors tend to feel good about their decisions and like the programs in which their children are enrolled.

6. The educational impact of school choice is ambiguous at best. In some districtwide programs, a correlation may exist between choice and the improvement of students' academic performance. In statewide programs, no such connection could be found.

7. School choice, to be successful, requires significant administrative and financial support. It is not a cheap path to educational reform.

8. Statewide "choice" programs tend to widen the gap between rich and poor districts.

9. School choice works best when it is arrived at gradually, locally, and voluntarily--not by top-down mandates.[88]

School/Site-Based Management

A final approach to educational reform considered by this review is what is commonly called school-based or site-based management. Earlier forms of site-based control over certain key aspects of management such as budget and curricula were begun in the 1960s under the label of decentralization.[89] These early efforts were primarily focused on breaking down the highly bureaucratic large city school systems in an effort to increase local political control, efficiency, and accountability.

During the late 1980s, notions of school-based management retained the earlier goals of efficiency and accountability but also incorporated more sophisticated notions of teacher and parent empowerment in order to bring about substantive change in educational practice. In David's terms, school-based management is an attempt to replace bureaucratic regulation with professional responsibility. White[90] defines school-based management as "a system of decentralization in which authority over school policy is shared by the central

office and the school site." White describes the purpose as improving the teaching and learning environment for students through making changes in traditional structures of authority, with new relationships between teachers, administrators, parents, and students, rather than simply reorganizing administrative responsibilities.

There are strong parallels between the rationale for school-based management and the literature on emerging management practices in business and industry. Quality circles, for example, have be been used as a methodology for implementing site-based management in the school.[91] [92] The assumption that the quality of decisions will be enhanced by empowering those nearest to execution of the decisions seems to underlie both public and private sector management reform.

School-based management as a technique of reform is often coupled with school choice. Districtwide (intradistrict) school choice plans which provide specialized schools, career magnet schools, or academy schools within schools require the type of variability in management, budget, and decision making authority advocated under school-based management. Conversely, the notion of "community schools" (schools which involve the immediate community of parents, businesses and others) which is often a part of school-based management, may be increasingly difficult in choice plans which involve placing large numbers of students in schools outside their area of residence.

School-based management generally incorporates two basic components -- greater school autonomy, and broader participation in decision making. Greater school autonomy provides for school site decision making in one or more areas such as budget, staffing and curriculum. The degree of autonomy enjoyed by the local school can vary from relief from district regulation in relatively minor areas of the budget to almost total local control over personnel decisions, curriculum content and methods, student assignment and grading policies, and so on. The degree of participation in such decisions by professional staff, parents, students, and the community, however, may still vary widely even under conditions of greater school autonomy. Although exact figures are not available, White[93] stated that more than 100 school districts had at least experimented with school-based management by the late 1980s and that over 60 districts in California alone were then managed under some form of shared decision making.

Wong[94] provides a useful conceptual model for examining various site-based arrangements. He proposes two dimensions: (1) Types of Governance Reform and (2) Policy Domains. The two types of decentralized governance are (a) principal-centered site-based arrangements in which the principal and teaches enjoy extensive autonomy from central bureaucratic direction and where parents play a formal, advisory role, and (b) parent empowerment arrangements that give parent representatives legitimate control over factors

such as the school budget, the principal's tenure, and curricular matters. The Two Policy Domains he proposes are (a) budgetary allocation and (b) instructional policy. Although focusing his study on the impact that these two dimensions may have on schooling opportunities for disadvantaged students in inner cities, the model incorporates the two major ways in which site-based plans seem to differ. These two ways relate to who is empowered and/or relieved from regulation and in what domains of management and decision-making that empowerment is effected. The Chicago School Reform Act of 1988 is an on-going example of parent empowerment in that mandated local school councils are composed of the principal, two teachers, six parents, and two community members. The councils have substantive control over the budget as well as the hiring and firing of principals and teaches.[95] School councils mandated under the Kentucky Educational Reform Act (KERA), on the other hand, require membership including the principal, three teachers and two parents. Under the KERA school councils are empowered to set policy in eight areas: curriculum, staff time, student assignment, schedule, school space, instructional issues, discipline and extracurricular activities.[96]

A comprehensive study of teacher involvement in decision making was conducted in Wisconsin.[97] This study replicated an earlier study by one of the authors conducted in the same Wisconsin schools in 1980 and focused on determining if a decade of attention to and advocacy of enhanced teacher professionalism and empowerment had an impact in five areas; whether (a) involvement in decision making had continued to be related to teacher's job satisfaction; (b) teachers' reported levels of actual and desired involvement in decision issues had increased; (c) teachers' levels of interest and expertise in decision issues had changed; (d) teachers' perceptions of their influence in the decision-making process had increased; and (e) teachers' job satisfaction had improved. They found that the higher the level of implementation of site-based management, the higher the level of respondents' decision participation, influence, and job satisfaction. Change over time between the two studies indicated increased actual involvement in decision making, increased desired involvement, reduced deprivation (discrepancy between desired and perceived actual levels of decision involvement), increased interest in decision issues, and increased perceived expertise in decision issues. Teachers' perceived levels of influence were positively correlated with their reported levels of decision involvement, interest in decision issues and job satisfaction. In contrast to the policy domains classified by Wong as budgetary allocation and instructional policy.[98] Rice and Schneider differentiated two policy domains of instructional/technical and schoolwide/managerial. Teachers reported greater discrepancies between desired and actual participation in decision making in the managerial/schoolwide domain.[99]

While the stated purposes of site-based management arrangements have been extended beyond the original decentralization purposes of increasing local political control, efficiency and accountability, to the actual improvement of

school practice and learning outcomes, little information is currently available on actual impact on students. Much of the research focus has been on how site-based management is implemented, on barriers and facilitators, and on impact on traditional management structures and participants. There appears to be a growing awareness that site-based management affects not only principal, teacher and parent roles but also requires profound changes in the roles of school board members, superintendents, and district personnel. Also, site-based management is often only one of several aspects of educational reform taking place simultaneously in many school districts. The attribution of outcomes to a single reform in a complex of interrelated reform actions will remain problematic. Two recent studies, however, have addressed the impact on participants and processes and, to a limited extent, impact on outcomes.

In the second year of a five-year study of school-based decision making (SBDM) under the Kentucky Educational Reform Act, David cites both some apparent successes and some continuing issues or problems. Successes include SBDM serving as a major force in communicating the importance of KERA and serving as a critical link between schools and their communities. Participation on councils and in council elections is one problem area. The number of parents voting in elections and running for councils is still quite small although the percent of parents voting has risen from 4% to 22% in those school districts which have school councils in place. Teacher participation is a problem in some schools, especially in primary schools. Other participation issues include the mandatory composition of the councils, a desire for longer terms, the desired expansion of council membership, and in some schools, the desire to have someone other than the principal as chair. It was found that more authoritarian principals tend to head councils whose teacher and parent members feel powerless.

A second problem area lies in the area of training council members and the focus of council activity. Training has tended to focus on the legal and technical details of the reform legislation and council responsibilities and "detracts from the intent of the law and results in micromanaging school operations rather than keeping concerns about the quality of teaching and learning in the forefront".[100] Of the eight policy areas in which councils have authority, most activity has been in the areas of discipline and extracurricular activities. David states, however, that councils appear to be moving into the areas of staffing, curriculum and instruction. Teachers, students and parents are enthusiastic in those schools where adversarial relationships have shifted to true partnerships.

Walberg and Niemiec[101] assessed the impact of the 1988 Chicago School Reform Act on the three targets of that act, student achievement, attendance and graduation rates. The intent of the Act was to raise each of these to the level of national norms (averages) within five years. The primary mechanism for accomplishing these goals was the transfer of the major decision-making

authority from the central office to the 11 member local school councils. These councils are empowered to set school policy, formulate school improvement plans, have considerable control over school budgets and to hire and fire principals and teachers. The authors conclude that over the three years from 1988 to 1991, achievement scores have actually declined. Attendance rates over the period of 1988 to 1991 have remained stable and dropout rates have worsened. Walberg and Niemiec state "Put simply, three years into restructuring, the Chicago Public Schools were accomplishing less, but the new players - principals, teachers, and council members - thought well of their own accomplishments."[102]

Site-based management is a restructuring strategy adapted form business and industry where results have been largely positive in terms of product quality and profitability. As has been learned in other earlier applications of private sector management theory to education, however, the myriad of uncontrolled variables, the lack of control over inputs and total budget, and often lack of consensus on desired outputs, provide unique challenges to such well-intentioned efforts. As with the other strategies of reform examined in the present review, most are in their infancy and from a research point of view, treatments are ill defined and often interrelated.

3. REFORM IN VOCATIONAL EDUCATION

The general organization of this section is to provide an analysis of change in vocational education, first in relation to the early 1980s reforms, then, to the extent possible, in relation to more recent restructuring proposals. The 1990 Amendments to the Perkins Act (Perkins II) reflect both what Bailey[103] has called quantitative or early reform proposals, and the later integrative or restructuring proposals. This section is organized around these two concepts -- quantitative and integrative. These concepts parallel reforms commonly described in the literature as wave one and wave two and, as Bailey points out, parallel reforms taking place in American business and industry. Where appropriate, data from the National Assessment of Vocational Education (NAVE) surveys conducted during 1992 are used to examine change in vocational education.

Vocational Education and Quantitative Reform

Although there is mounting criticism of the ultimate success of the early, quantitative reforms, these reforms were the cornerstone of many states' reform agendas and, in fact, are the central strategy outlined in America 2000: An Education Strategy. Certain provisions in Perkins II reflect this approach, primarily through the requirements for accountability through Core Standards and Measures of Performance (Section 115), State Assessments (Section 116), and Program Evaluation and Improvement (Section 117). The Perkins amendments require that states, through committees of practitioners, develop

systems of core standards and performance measures to be implemented for all supported vocational programs by 1992. While providing individual states with latitude as to what specific measures and standards are to be used, the legislation requires measurement of learning and competency gains (including basic and more advanced academic skills), measures of performance, incentives and adjustments designed to promote access to and success in vocational education by targeted groups and special populations, and procedures for using resources and methods developed in other federally supported programs (Perkins II, Section 115 (b)). This provision of Perkins II incorporates the outcomes accountability concept inherent in the earlier standards and testing reform initiatives but also reflects awareness of the latter reforms in that localities are guaranteed the opportunity to modify and adapt state-developed core standards and measures to unique local needs and conditions.

A required state assessment (Perkins II, Section 116) calls for measurable objective criteria which include such factors as increased student work skill attainment, and job placement, and basic and higher order current and future workplace competencies which will reflect the hiring needs of employers. The required annual evaluation of programs (Section 117) includes evaluation of the progress of individuals who are members of special populations in vocational education programs assisted under the Act, and evaluation of the progress of vocational education programs assisted under the act in providing vocational education students with strong experience in and understanding of all aspects of the industry the students are preparing to enter. An analysis of these requirements by Hill, Harvey, and Praskac[104] concluded:

> The Perkins Act requirements were meant to reassure critics that the legislative supporters of vocational education were serious about quality, and that lax or self-indulgent program administration would not be tolerated. But members of Congress did not want to set themselves up as the remote, ultimate judges of local processes. Instead, they wanted to create a framework of processes that would guarantee that quality issues received due attention at the local and state levels.

Attributing changes in vocational education directly to the national goals, testing, and accountability (quantitative) initiatives of the early 1980s reforms is not possible. There is, however, some evidence of reduced time for vocational instruction and reduced vocational enrollments apparently related to first-wave increases in graduation requirements and the increased focus on academic requirements. Hooper[105] found that 80% of secondary vocational education respondents reported a decrease in the amount of time allowed for students to enroll in vocational education. More than two-thirds of the respondents to this survey also reported declining enrollments in vocational classes over the previous three years. Nowak and Hiatt[106] report that in

California, there was an average increase from 1981-1986 in academic course offerings of 15.4% and a corresponding average decrease in vocational education offerings of 15.9%. Business education enrollments were down 3.2%, industrial education enrollments dropped 19.7%, and home economics classes enrolled 23.8% fewer students during this five-year period. A more recent longitudinal data collection effort by Strickland[107] reports decreasing vocational enrollments in 31 states and increasing vocational enrollments in 19 states from 1982 to 1988. These authors report that increasing enrollments were noted primarily in states where there had been concerted efforts to reform or restructure vocational education. One problem with assuming that enrollment changes in vocational education are due to education reform initiatives is the possibility of confounding with other possible causes for enrollment changes. The Strickland et.al. study examined this possibility by comparing vocational enrollment trends with overall enrollments. Focus group participants pointed out the sensitivity of vocational enrollments to the general "push" for college enrollment as well as the problem of interpreting overall decreases in student enrollments as declining interest in vocational education. Many focus group participants noted that early vocational enrollment declines (early 1980s) had largely been reversed with many programs now evidencing increased enrollment. Increasing enrollment was noted in a number of new or redesigned programs.

Data from the National Assessment of Vocational Education (NAVE) omnibus surveys provide the most recent assessment of vocational education enrollments, course offerings, and staffing trends. The NAVE surveys were comprehensive and investigated a number of policy areas, including impact of educational reform on vocational education. Populations surveyed included: (a) State Directors of Secondary Vocational Education, (b) State Directors of Postsecondary Occupational/Technical Education, (c) Secondary School Districts, Version A and Version B Questionnaires, (d) Secondary Vocational School Districts, (e) Secondary Schools, and (f) Postsecondary Institutions.

In the NAVE Survey of Public Secondary School Districts (Version B Questionnaire), 78.4% of respondents reported that in the last five years (1987-1992) there had been an increase in the proportion of academic credits required for graduation. Likewise, 62.9% reported that the proportion of academic credits needed to enter state university systems had increased. Paralleling the earlier findings of Firestone, Fuhrman, and Kirst,[108] the NAVE survey found that mandates for longer school days were reported by only 11.9% , and for longer school years, 18.7% of the school districts (Note: school district percentages are population proportions estimated from a weighted sample of respondents).

State Directors of Secondary Vocational Education (NAVE Survey of State Directors of Secondary Vocational Education) responded to similar questions. Reporting on actions during the past five years, responses were: an increase in

proportion of academic credits required for high school graduation, 87.50; an increase in proportion of academic credits needed to enter state university system, 64.0%; an increase in academic college credits needed for teacher certification, 47.9%; a mandate for longer school day, 09.6%; and for a longer school year, 13.0%.

In the NAVE district survey, 22.2% of districts reported implementation of required proficiency or other exams for graduation within the past five years (with 15.5% reporting the requirement of such exams prior to that time), and 20.1% predicted such exams would be required within the next year. Those secondary school districts that reported major education reform efforts within the past five years were asked how those reforms had affected various aspects of vocational education. Responses are summarized in Table 1.1.

Table 1.1

Effects of Educational Reform on Vocational Education Enrollments, Courses, and Staffing: NAVE Secondary School Districts Survey (Version B Questionnaire)[a]

Area	Increase	Decrease	Not Affected
Total district enrollment in vocational education	20.6	44.4	35.1
Enrollments at area vocational schools	25.2	30.5	44.2
Enrollments of students with disabilities in vocational education	32.9	5.6	61.5
Enrollments of educationally disadvantaged students in vocational education	37.4	8.4	54.2
Total number of vocational course offerings	30.0	32.2	37.8
Variety of vocational course offerings	36.5	27.5	36.0
Number of vocational teachers	12.8	35.2	52.0

[a] Numbers represent percent of districts indicating each option and are estimates of population proportion based on weighted sample) Note: Rows may not total to 100% due to rounding.

The NAVE Survey of Secondary Vocational School Districts asked several of the same questions that had been posed to regular secondary districts. Of the respondents to this survey, 84.1% reported an increase in the proportion of academic credits required for graduation within the past five years and 64.8% reported an increase in the proportion of academic credits needed to enter the state university system in the same time period. Lower percentages of respondents reported increases in the length of the school day (8.2%) or the school year (10.3%). Approximately 31% reported that proficiency or other exams had been instituted as a requirement for graduation within the past five years (1987-1992).

The secondary vocational district respondents who had reported major educational reform efforts within the past five years were asked how those reforms had affected vocational education. Responses to questions related to the impact of reform on vocational education within vocational school districts are summarized in Table 1.2.

Table 1.2

Effects of Educational Reform on Vocational Education Enrollments, Courses and Staffing: NAVE Secondary Vocational School Districts Survey *

Area	Increase	Decrease	Not Affected
Total district enrollment in vocational education	19.0	60.2	20.9
Enrollments of students with disabilities in vocational education	58.4	1.9	39.7
Enrollments of educationally disadvantaged students in vocational education	67.0	3.8	29.2
Total number of vocational course offerings	39.5	41.0	39.5
Variety of vocational course offerings	21.2	30.8	48.1
Number of vocational teachers	14.7	46.9	38.4

* Numbers represent proportion of vocational districts indicating each option. Rows may not total to 100% due to rounding.

Tables 1.1 and 1.2 reveal a general pattern of more districts reporting decreases in vocational enrollments than increases but with considerably higher proportions reporting increases than decreases of enrollments of special populations. A comparison of Table 1.1 with Table 1.2 reveals that these trends are more pronounced within vocational school districts. Over 60% of the vocational districts reported decreases in vocational student enrollments, whereas 44.4% of the regular school districts reported such decreases. Increases in enrollment of students with disabilities in vocational courses were reported by 58.4% of the vocational districts and 32.9% of the regular school districts. Increases in enrollments of educationally disadvantaged students were reported by 67.0% of the vocational districts and 37.4% of the regular school districts.

About an equal proportion of regular school districts reported increases as reported decreases in vocational course offerings. However, among vocational school districts, a higher proportion (41.0%) report decreases than report increases (19.5%). A higher proportion of regular school districts report increases in the variety of vocational course offerings (36.5%) than decreases (27.5%), but in vocational school districts, a higher proportion report decreases (30.8%) than increases (21.2%). Both regular and vocational school districts have higher proportions reporting decreases in the number of vocational teachers (35.3% and 46.9%, respectively) than reporting increases (12.8% and 14.7%, respectively). A final source of data on the impact of educational reforms was State Directors. The NAVE Survey of State Directors of Secondary Vocational Education asked the same questions about reform as questionnaires directed to school divisions and individual schools. The state-level perspective is summarized in Table 1.3.

The NAVE Survey of Public Secondary Schools asked respondents to rate agreement or disagreement with the statement, "The opportunity for students in this school to elect vocational courses or programs has been **reduced** by educational reform activities." Either agreement or strong agreement with this statement was indicated by 61.6% of respondents. When asked how much of a problem it is to maintain vocational enrollments, 49.2% responded that it was either a moderate or serious problem. Another 30.4% reported maintaining vocational enrollments as a "small problem." In addition to the above questions, the survey of secondary schools asked respondents to report enrollment trends (not necessarily linked to reform actions). Table 1.4 provides a summary of results.

In contrast to the surveys of impact of educational reform on vocational enrollments, course offerings, and vocational teachers (increased, decreased, not affected) in school districts, the survey of secondary schools asked respondents to estimate the degree of enrollment change. Although 12.4%

Table 1.3

Effects of Education Reform on Vocational Education Enrollments, Courses, and Staffing: NAVE Survey of State Directors of Secondary Vocational Education*

Area	Increase	Decrease	Not Affected
Total enrollments in vocational education	13.7	70.6	15.7
Enrollments of students with disabilities in vocational education	56.6	01.9	41.5
Enrollments of educationally disadvantaged students in vocational education	64.2	01.9	34.0
Total number of vocational course offerings	18.5	64.8	16.7
Variety of vocational course offerings	30.2	43.4	26.4
Number of vocational teachers	09.6	75.0	15.4

* Numbers are percent of respondents indicating each option. Rows may not total to 100% due to rounding.

reported a decrease in vocational enrollments of greater than 10%, and 26.6% reported decreases of six to ten percent, these percentages roughly parallel decreases (12.8% and 27%, respectively) in total school enrollment during the same period. Reported trends in enrollment of special populations students in vocational education were in the opposite direction. Approximately 28% reported a 6% or greater increase in enrollments of students with disabilities in vocational education, 43.4% reported an increase of 6% or greater in enrollments of students with economic or educational disadvantagement, 21.9% reported a similar increase in enrollments of students with limited English proficiency, and 26.2% reported a 6% or greater increase in enrollments in vocational education by students with other special needs. Determining from the NAVE surveys the extent to which these changes parallel changes in the total school special populations enrollments is not possible.

The NAVE Survey of Public Secondary Schools also asked respondents to report how the number of vocational course offerings had changed over the past five years (1987-1992) in each of the vocational program areas. A

Table 1.4

Secondary Schools Enrollments
NAVE Survey of Public Secondary Schools

Area	Decrease > 10%	Decrease 6 - 10%	Minimal +,- 5%	Increase 6 - 10%	Increase > 10%
Total school enrollment	12.8	27.0	31.8	19.1	09.3
Vocational education enrollment	12.4	26.6	36.9	17.7	06.5
Vocational enrollment of: students with disabilities	01.5	05.4	65.6	23.2	04.4
Ec. or Ed. disadvantaged	01.1	04.7	50.7	33.6	09.8
Limited English prof.	01.0	03.5	73.6	15.9	06.0
Other special needs	00.9	02.9	70.0	21.6	04.6

summary of findings from this question is presented in Table 1.5. Relatively high percentages reported not offering Agricultural Education (46.6%), Occupational Home Economics (26.8%), Marketing/Distributive Education (36%), Health Occupations (45.1%), or career exploration (44.8%) in the last five years. The percentages of schools reporting an expansion or reduction of course offerings are to some extent an artifact of the proportion of schools providing coursework in a given vocational program area. (Programs offered in a larger number of schools are apt to have higher percentages reporting positive or negative change.) For this reason, a more meaningful way to examine course change is to compare the proportion reporting expansion with the proportion reporting reduction or elimination within each program area. These percentages are as follows (expansion and reduction/elimination, respectively): for Agricultural Education; 9.6%, 11.8%; for Business and Office Education; 23.5%, 25.1%; for Occupational Home Economics Education; 12.8%, 18.7%; for Marketing/Distributive Education; 10.4%, 14%; for Health Occupations Education; 15.4%, 8.4%; for Trade and Industrial Education; 15.4%, 27.2%; and for Career Exploration; 18.6%, 7.9%. The Trade and Industrial Education program area reflects the greatest discrepancy.

The NAVE Survey of Public Secondary Schools also asked respondents to indicate one or more reasons for vocational program expansion. Table 1.6 summarizes findings from this question. Of the respondents, almost half (47%)

Table 1.5

Number of Course Offerings in Vocational Programs: NAVE Survey of Public Secondary Schools (N = 2016)[a]

Area	Not Offered in Last 5 Yrs	Been Expanded	Been Reduced	Been Eliminated	No Change
Agricultural Education	46.6	09.6	08.2	03.6	32.1
Business & Office	08.5	23.5	23.9	01.2	42.8
Occupational Home Econ.	26.8	12.8	16.2	02.5	41.6
Marketing/Distributive	36.0	10.4	10.0	04.0	34.6
Health Occupations	45.1	15.4	04.6	03.8	31.1
Trade and Industrial	16.5	15.4	24.9	02.3	40.8
Career Exploration	44.8	18.6	05.3	02.6	28.6

[a] Numbers represent proportion of responding schools selecting each option. Rows may not total 100% due to rounding.

reported that no vocational programs had been expanded in the past five years. Of those reporting expansion, however, the most common reason cited was an increase in student interest in program (64.7%), followed by labor market demand (34.5%), an overall increase in school enrollments (23.8%), and increased support or guidance from their school district (22.7%). Other reasons for expansion received somewhat lower percentages of endorsement.

Table 1.7 summarizes respondents' stated reasons for vocational program reduction or elimination. No vocational program reductions or eliminations during the last five years were reported by 44.2% of respondents. Of those who did reduce or eliminate programs, though, 59.4% indicated a decline in student interest in program area as a reason. Other prominent reasons were overall decreases in school enrollments (34.0%), reduced funding (22.5%), loss of appropriate teachers without replacement (16.2%), new state or district policy (15.3%), and declining job placement rates (14.8%). Reduced support or guidance from the school district was the most infrequent response (12.4%).

Postsecondary enrollment changes from 1987-1988 through 1991-1992 were obtained through the NAVE Survey of Two-Year Postsecondary Institutions and are summarized in Table 1.8. As would be expected from general

Table 1.6

Reasons for Expansion of Vocational Programs:[a]
NAVE Survey of Public Secondary Schools (N = 2016)

Reason	N	Percent
No vocational programs expanded	947	47.0
Overall increase in school enrollments	254	23.8[b]
Increase in student interest in program	692	64.7
Labor market demand	369	34.5
New state or district policy	124	11.6
Request by employers or PIC (JTPA)	107	10.0
Creation of vocational track, certificate, or diploma	74	06.9
Increased support or guidance from school district	243	22.7
Increased funding	139	13.0
Other	119	11.1

[a] Respondents were asked to check all which apply
[b] Percents other than "No vocational programs expanded" are based on respondents who had indicated any program expansion (N = 1069)

population demographics, general enrollment change for postsecondary institutions was opposite that of secondary schools. Seventy-five percent of the respondents reported an overall increase in enrollments of six percent or greater, and 58.5% reported increases in occupational/technical enrollments of six percent or greater. Occupational/technical enrollments of special populations students increased in each category with the following percentages of respondents reporting a six percent or greater increase: students with disabilities, 37.0%; educationally or economically disadvantaged students, 59.6%; students with limited English proficiency, 30.4%; and students with other special needs, 33.0%. Again, determining whether these enrollment trends of special needs students in occupational/technical programs parallel trends in the general school population is not possible from the NAVE data.

Vocational Education and Integrative Reform

Changes in academic requirements, enrollments, class sections, staffing, testing programs, and other accountability measures could be expected to occur, at

Table 1.7

Reasons for Vocational Program Reduction or Elimination:[a] NAVE Survey of Public Secondary Schools (N = 2016)

Reason	N	Percent
No vocational programs reduced or eliminated	892	44.2
Overall decrease in school enrollments	382	34.0[b]
Decline in student interest in program area	668	59.4
Declining job placement rates	16.6	14.8
New state or district policy	172	15.3
Loss of appropriate teachers W/O replacement	182	16.2
Reduced support or guidance from school dist.	139	12.4
Reduced funding	253	22.5
Other	95	08.5

[a] Respondents were asked to check all which apply

[b] Percents other than "No vocational programs reduced or eliminated" are based on number of respondents who had reported any program expansion or elimination (N = 1124)

least partially as a result of the early quantitative reforms. These changes have been fairly well documented, particularly in the NAVE surveys. The possible impact of the later restructuring reforms are more difficult to assess, however. This is partially due to their recency, and also because of their more indirect affects on measures commonly collected on vocational programs and students. Bailey's[109] conceptualization of these reforms as being integrative (as opposed to the more common terminology of restructuring) is useful for organizing and presenting available information. Bailey views the integrative reforms as paralleling what is currently taking place in many businesses and industries, namely, change in three ways: what they do, how they are organized internally to do it, and how they relate to outside constituencies and institutions. He views the educational analogs to be curricular integration, organizational integration, and institutional integration. These areas correspond to emphases in the Perkins II legislation.

Table 1.8

Postsecondary Enrollment Changes From 1987-1988 Through 1991-1992:[a] NAVE Survey of Two-Year Postsecondary Institutions (N = 993)

Area	Decrease > 10%	Decrease 6 - 10%	Minimal + - 5%	Increase 6 - 10%	Increase > 10%	NA[b]
Total Student Enrollment	04.2[a]	04.2	16.4	30.2	44.9	00.2
Occ/Technical Enrollment	05.1	09.1	25.9	29.9	28.6	01.7
Occupational/Technical Enrollments of:						
Students/Disabilities	01.8	03.1	45.7	23.3	13.7	12.5
Educationally or Economically Disadv.	02.2	02.6	26.3	33.3	26.3	10.6
Limited English Prof.	03.1	02.4	50.2	15.3	15.1	14.0
Other Sp. Needs	01.1	02.1	41.4	22.3	10.7	22.5

[a] Numbers indicate proportion of respondents electing option
[b] NA = Don't Know

Curricular integration. One of the prominent areas of concern found in Perkins II is the integration of vocational and academic education. Section 201 stipulates that professional development activities for vocational and academic teachers include activities designed to foster the integration of vocational and academic curricula. Also, Section 201 requires the expenditure of funds for development, dissemination, and field testing of curricula; particularly curricula that integrate vocational and academic methodologies and which provide a coherent sequence of courses through which academic and occupational skills may be measured. Under Title III, Part E, Tech-Prep Education, tech prep programs are required to include a common core of required proficiency in mathematics, science, communications, and technologies.

The reforms of the early 1980s focused primarily on increasing academic skills through requirements for increased academic credits, increased time spent on academic instruction, and increased academic rigor, but failed, for the most part, to recognize vocational education's potential contribution to academic learning. The net effect of the early reforms probably resulted in greater separation of academic and vocational education, since greater portions of

available student instructional hours were mandated for academic coursework. There was some trend toward granting academic credit for vocational instruction, but such credit was mostly in lower level or general academic requirements. This probably served more to reinforce the separation or tracking of students than to break down existing barriers.

The early ideas about "learning by doing" or learning academics in an applied setting, as expressed by John Dewey, have maintained a following among those who have viewed vocational education as a methodology as well as a body of content and skills. These ideas have achieved renewed credibility recently through the work of cognitive scientists.[110] To some extent, these ideas form a partial basis for claims that the vocational education setting promotes learning of abstract concepts by students who have particular difficulty with traditional academic teaching methods. Until recently, however, federal legislation for vocational education, especially through funding formulae and approved uses of funds, has tended to reinforce separation rather than the integration of academic and vocational education. With the new Perkins II requirements focusing on academic as well as vocational skills, one may expect to see change beginning to take place in this area.

Focus group participants pointed out the necessity of viewing the integration question as a two-way street, noting that academic teachers also need to focus on application of academic skills through providing practical examples. It was noted that present teacher education programs probably do not prepare academic teachers adequately in this area. Another area of concern to many focus group participants was the unwillingness of many higher education institutions to accept applied academics courses as meeting entrance requirements.

The NAVE surveys included a number of questions designed to investigate vocational/academic curriculum integration. The NAVE Survey of School Districts (Version B Questionnaire) included a number of questions related to curriculum integration. Forty-two percent of the respondents reported adding or expanding applied academic courses, 40.5% added or expanded integrated courses or course materials, and 28.4% added or expanded general or transferrable occupational skills training within the past five years (1987-1992). Of respondents to the NAVE Survey of Vocational School Districts, 63.3% reported adding or expanding applied academic courses, 70.4% had added or expanded integrated courses or materials, and 50.2% reported adding or expanding instruction in general or transferrable occupational skills. Both types of school districts reported receiving relatively high levels of support from the state for integration activities--66.6% (Version B) and 74% (Vocational Districts) reporting adequate or very good support. When vocational districts were asked about the kind of effect the 1990 Perkins Act emphasis on vocational and academic integration has had on the administration and implementation of vocational education in their district, 37.8% reported very

positive and 44.9% reported slightly positive. Among other school districts (Version B Questionnaire), 23.7% reported a very positive effect and 35.8% reported a slightly positive effect. School district respondents were asked to assess the extent to which such things as the SCANS Report, America's Choice, America 2000, the National Goals, and others had influenced their district's efforts to integrate academic and vocational education. Both types of districts had the highest percentages listing state reforms initiatives, local reform initiatives, and the 1990 Perkins Act as moderately or largely serving as motivators for such actions. When asked about the combined effects of educational reform efforts on various conditions in their school districts, 75.4% of the vocational districts and 61.4% of the other districts responded they had increased efforts to integrate vocational and academic education. Over half (56.1%) and 69.8% of the vocational district and other district respondents, respectively, agreed or strongly agreed with the statement, "Substantial improvements have been initiated in vocational curricula due to reform activities in your state or district."

School districts were also presented with a series of questions about the types of activities they have carried out or plan to carry out to integrate vocational and academic education. Their responses are summarized in Tables 1.9 and 1.10. Similar questions appropriate to individual schools were included in the NAVE Survey of Public Secondary Schools. Responses to these individual school questions are summarized in Table 1.11. Schools also indicated which of selected academic areas they were integrating with each vocational program area. Responses are summarized in Table 1.12.

Questions dealing with curriculum revision and integration of occupational/technical and academic education were included in the NAVE Survey of Two-Year Public Postsecondary Institutions. Almost half (47.5%) of respondents indicated that they had added or expanded applied academics courses, and 64.4% had added or expanded general or transferable occupational/technical skills training. Changes in the Perkins II legislation which place emphasis on integration of occupational and general education were assessed for their impact on the administration and implementation of occupational/technical programs. The impact of these changes was assessed as either slightly positive or very positive by 63.4% of respondents. As was the case with secondary school divisions and schools, the postsecondary survey also included a series of questions about the kinds of steps institutions have taken or anticipate taking to promote the integration of occupational/technical and general education. Responses to these items are summarized in Table 1.13.

Organizational integration. The second of Bailey's[111] three forms of integration taking place in business and industry deals with the ways they may reorganize internally, for example, moving away from hierarchical management, decentraliza-tion of authority and responsibility, and increased

Table 1.9

Steps Taken to Integrate Vocational and Academic Education[a]
NAVE Survey of Public Secondary School Districts (Version B Questionnaire)

Steps Taken or Planned	Started Before 1991-1992	Started or continued 1991-1992	Planned for or continued 1992-1993
Hold planning meetings to develop policies or procedures for implementing an integrated program	39.2	66.8	75.3
Develop academies or occupationally oriented schools within schools	09.2	14.0	19.9
Develop occupationally oriented magnet or high schools	05.5	08.5	11.6
Develop occupational clusters, career paths, career tracks, or "occupational majors"	26.0	39.1	49.3
Integrate curricula across vocational and academic courses	41.8	63.6	79.1
Develop sequence(s) of integrated vocational and academic courses	36.7	53.5	69.3
Develop guidance and counseling activities to promote integration	41.4	64.4	77.6
Provide in-service training for vocational teachers on integration	32.2	55.1	69.5
Provide in-service training for academic teachers on integration	21.3	43.2	62.2
Evaluate vocational teachers on instruction in mathematics, reading, and/or writing	16.0	24.8	40.0
Other activities	15.7	35.1	46.1

[a] Numbers are percent indicating "yes" to each item and are population estimates based on weighted sample. Rows do not add to 100% since columns are not independent.

Table 1.10

Steps Taken to Integrate Vocational and Academic Education[a]
NAVE Survey of Public Secondary School Districts

Steps Taken or Planned	Started Before 1991-1992	Started or continued 1991-1992	Planned for or continued 1992-1993
Hold planning meetings to develop policies or procedures for implementing an integrated program	64.1	87.8	96.0
Develop academies or occupationally oriented schools within schools	15.4	26.3	32.4
Develop occupationally oriented magnet or high schools	17.4	19.0	25.6
Develop occupational clusters, career paths, career tracks, or "occupational majors"	53.1	69.4	78.4
Integrate curricula across vocational and academic courses	57.7	83.3	92.4
Develop sequence(s) of integrated vocational and academic courses	49.6	74.2	88.3
Develop guidance and counseling activities to promote integration	49.8	72.5	83.9
Provide in-service training for vocational teachers on integration	48.4	73.0	91.3
Provide in-service training for academic teachers on integration	36.9	61.0	81.4
Evaluate vocational teachers on instruction in mathematics, reading, and/or writing	23.6	31.9	56.0
Other activities	53.3	50.0	50.0

[a] Numbers are percent indicating "yes" to each item and are population estimates based on weighted sample. Rows do not add to 100% since columns are not independent.

Table 1.11

Vocational and Academic Integration[a]
NAVE Survey of Public Secondary Schools

Steps Taken or Planned	Started Before 1991-1992	Started or continued 1991-1992	Planned for or continued 1992-1993
Incorporate employability or generic work force skills into vocational curricula	77.2[1]	81.7	88.3
Develop integrated curricula across vocational and academic courses	43.8	59.9	77.8
Develop sequence of integrated vocational and academic courses	38.5	52.1	71.7
Use applied academics or other integrated curricula from commercial vendors (e.g., Principles of Technology)	33.0	44.5	61.1
Use cross-curriculum materials (e.g., Writing across the Curriculum)	37.0	46.1	59.1
Establish procedures for collaboration between academic and vocational teachers to develop or implement integrated courses	36.6	56.8	75.8
Provide common planning periods for vocational and academic teachers to work on integration	17.8	25.3	44.8
Increase time available to teachers to work on integrated courses	14.8	26.7	43.5
Provide "tandem courses" where students take coordinated vocational and academic courses	19.9	27.3	45.6
Provide interdisciplinary courses combining occupational issues and academic disciplines (e.g., History of Technology, Society, and Technology. The Literature of Work)	11.9	16.5	31.8
Other	14.3	26.1	32.6

[a] Numbers are percent of schools answering yes to each option. Rows do not add to 100% since columns are not independent.

Table 1.12

**Integration of Vocational Areas with Selected Academic Subjects*
NAVE Survey of Public Secondary Schools**

Vocational Program Area	Mathematics	Science	Communications/ English
Agricultural education	15.9	21.2	11.8
Business and office education	37.4	10.2	44.1
Marketing/distributive education	20.1	06.3	20.4
Occupational home economics	18.9	16.0	18.6
Health occupations education	17.7	23.0	17.6
Trade and industrial education	45.9	30.4	30.3

* Numbers are percent of total sample (N = 2016) checking response option. Larger or smaller percentages are to some extent artifacts of the number of schools offering programs in a given vocational area.

flexibility. These ideas parallel the later education reforms discussed earlier such as site-based management, empowerment of local teachers and administrators, and articulation of different levels of programs. A general devolvement of federal authority and the corresponding shift to greater state and local authority and responsibility was an important thrust of federal education policy during the 1980s. School choice, a central theme of the 1980's reforms, is only possible through extensive internal organizational and managerial change.

Perkins II has a number of provisions which correspond with these general notions of internal organizational change. Changes in the intrastate funding formula were designed to move a greater percentage of federal funds to localities with the probable effect of diminishing state-level management and control over certain aspects of vocational programming and increasing local authority and responsibility. The new provisions for locally-directed evaluation and program improvement planning are examples of devolvement of authority and responsibility to the local level. The provisions which allow localities to modify state determined core standards and measures promote

Table 1.13

Integration of Occupational/Technical and General Education[a]
NAVE Survey of Two-Year Public Secondary Schools

Steps Taken or Planned	Started Before 1991-1992	Started or continued 1991-1992	Planned for or continued 1992-1993
Hold planning meetings to develop policies or procedures for implementing integrated programs	58.0	76.0	85.0
Establish general education competencies for occupational/technical students	73.5	83.6	90.6
Use applied academics or other integrated courses from commercial vendors (e.g., CORD, AIT)	14.8	22.9	38.6
Develop applied academics courses (such as Technical Math, Business English, etc.)	70.7	73.5	81.5
Use cross-curriculum materials (e.g., Writing Across the Curriculum)	52.2	59.2	70.2
Provide in-service training for occupational/technical staff on integration	31.7	45.2	67.1
Provide in-service training for general/transfer education staff on integration	23.6	34.8	59.2
Provide "tandem courses", where students take coordinated general education and occupational/technical courses	40.0	42.8	54.0
Provide interdisciplinary courses combining occupational issues and academic disciplines (e.g., History of Technology, Ethics in Business, The Literature of Work)	29.0	33.6	47.4
Support remedial/developmental education, learning labs, tutoring, and other steps to increase basic skills of occupational/technical students	94.0	94.7	95.9
Other efforts to integrate occupational/technical and general education	59.8	83.9	92.4

[a] Numbers are percent of respondents answering yes to each option

local empowerment. Provisions for an increased focus on articulation are an important aspect of tech prep programs (see Perkins II, Title III, Part E) and involve integration across levels of schooling and with business and industry.

The NAVE surveys included a number of items which addressed local control and responsibility. When asked about change in local control and flexibility in program development and implementation, 22.2% of responding local school districts (Version A Questionnaire) reported some increase and 3.5% reported large increases; 25.9% and 7.4% of local school districts (Version B Questionnaire) reported some or large increases, respectively; 32.6% of vocational districts reported some increase, with 7.4% reporting large increases; and 28.9% of local schools reported some increase in local school control and flexibility while 5.8% reported large increases. State Directors of secondary vocational education were questioned whether there had been a relaxation of state administrative rules for local school districts. About one-third (32.7%) of the directors indicated there had been a relaxation within the past five years and 34.6% anticipated such action within the coming year. Fourteen percent of the local school districts believed there had been a relaxation of state administrative rules for local districts associated with education reform, while another 18.0% anticipated such change within the coming year (Version B Questionnaire). Vocational district responses were similar with 12.1% reporting relaxation within the past five years and 24.5% anticipating such action within the next year.

Each respondent population rated the effects of new state roles and responsibilities under the Perkins II on local administration and implementation of vocational programs. The proportion of respondents rating the effects as either very positive or positive, respectively, were: local school districts, 5.2% and 24.6%; vocational school divisions, 5.5% and 31.4%; and two-year public postsecondary institutions, 10.0% and 24.2%.

Articulation as a form of institutional integration was primarily evident in responses to questions about tech prep. State support provided for tech prep implementation was rated as very good by 20.3% and adequate by 46.3% of local school districts (Version A Questionnaire), 29.0% and 39.6%, respectively by Version B Questionnaire respondents, and 40.0% and 43.3%, respectively, by vocational school district respondents. Both regular school districts and vocational school districts reported increases in the development of tech-prep programs. Twenty percent of local school divisions reported large increases and 35.3% reported some increase. Thirty-two percent of responding vocational districts reported large increases and 48% reported some increase in development of tech- prep programs. Perkins II has had a positive effect on the emphasis received by tech prep as viewed by 56.4% of the regular school districts and 73.1% of the vocational school districts.

Both local secondary school districts and secondary vocational districts estimated the combined effects of education reforms on articulation between secondary and postsecondary vocational education. The majority of secondary school districts and vocational districts (61.4% and 79.5%, respectively) reported that the effect had been to increase articulation. Over half (52.5%) of the secondary school divisions agreed or strongly agreed with the statement, "There is an increased emphasis on delivering vocational education through postsecondary rather than secondary educational institutions." Among vocational districts, 56.0% agreed with this statement.

Changes in funding stipulations and requirements in Perkins II can be viewed as both increasing flexibility in some areas and yet restricting it in others. The NAVE questionnaires attempted to gather feedback related to specific changes in Perkins II funding provisions. Tables 1.14, 1.15, and 1.16 summarize responses. Local schools ranked the overall effect of any funding changes from 1991-1992 on their school's vocational program, 9.1% responded very positive, 21.6%-- moderately positive, 25.3%-- no effect, 32.7%-- moderately negative, and 11.3%-- very negative.

Table 1.14

**Effects of Specific Funding Provisions of 1990 Perkins Act*
NAVE Survey of Public Secondary School Districts
(Version B Questionnaire)**

Funding Provision	Very Positive	Slightly Positive	No Effect	Slightly Negative	Very Negative
Elimination of matching funds requirement	32.3	17.5	38.3	07.1	04.8
New allocation rules for funding school districts and area vocational schools	10.0	25.6	36.2	16.4	11.8
New allocation rules for funds distributed within districts	10.2	21.4	48.1	13.9	10.2
Removal of disabled and disadvantaged set-aside funds	11.3	13.7	61.5	09.1	04.4
Removal of adult set-aside funds	05.8	10.7	75.1	05.2	03.2

*Numbers are percent of respondents indicating each option

Table 1.15

Effects of Specific Funding Provisions of 1990 Perkins Act[a]
NAVE Survey of Public Secondary Vocational School Districts

Funding Provision	Very Positive	Slightly Positive	No Effect	Slightly Negative	Very Negative
Elimination of matching funds requirement	46.0	18.7	27.7	04.5	03.1
New allocation rules for funding school districts and area vocational schools	23.7	21.4	17.4	20.1	17.4
New allocation rules for funds distributed within districts	14.6	17.8	36.5	17.8	13.2
Removal of disabled and disadvantaged set-aside funds	19.1	20.5	37.7	17.3	05.5
Removal of adult set-aside funds	09.5	12.7	35.9	27.7	14.1

[a]Numbers are percent of respondents indicating each option. Rows may not total 100% due to rounding.

A final aspect of the potential impact of education reform within the area of organizational integration is the extent to which localities and states are involved in school/site-based management, and parental/school choice. As stated in Section 2, little research has been conducted on how either of these reforms has, in fact, affected vocational education. The NAVE surveys do, however, provide some assessment of the extent to which these reforms are in place or are planned. Responses from secondary school districts and vocational districts are summarized in Table 1.17.

Institutional integration. Bailey's[112] final form of integration deals with the integration of the school with the workplace, primarily through relationships of the institutions of schooling with employers. Vocational education has a history of extensive linkages with employers, particularly in determining curriculum content and required skills, assessing labor market demand; providing the cooperative plan of instruction and customized training for particular employers; and through student and employer follow-up evaluations of vocational programs and graduates. Although not required under Perkins

Table 1.16

Effects of Specific Funding Provisions of 1990 Perkins Act[a]
NAVE Survey of Two-Year Public Postsecondary Institutions

Funding Provision	Very Positive	Slightly Positive	No Effect	Slightly Negative	Very Negative
Elimination of matching funds requirement	51.6	16.9	26.2	04.4	00.9
New allocation rules for secondary/postsecondary funding split	14.8	20.8	31.7	20.6	12.0
Removal of disabled and disadvantaged set-aside funds	16.4	20.8	40.1	16.2	06.4
Removal of adult set-aside funds	13.2	14.7	43.9	17.2	11.0

[a] Numbers are percent of respondents indicating each option

II, local programs continue to utilize local advisory councils and craft committees for curricular input, evaluation of programs, labor market analysis, and job placement assistance.

Perkins II includes extensive requirements for coordination with and input from employers and organized labor. These amendments also include extensive requirements for coordination with the Job Training Partnership Act (JTPA). Perkins II includes these requirements in the following areas: State Council, Section 112 (majority of membership from employers, trade or professional organizations, and organized labor, provide recommendations to State Board regarding initiatives and methods private sector could undertake to assist in modernization of vocational education, recommend procedures to enhance participation of local employers and labor organizations, make recommendations regarding coordination with JTPA); State Administration, Section 111 (coordination with State Job Training Coordinating Council, establishment of state technical committees, and provide information on programs to private industry councils); and State Plan, Section 113 (description of how funds expended for occupationally-specific training will be used for occupations in which job openings are projected or available based on labor market analysis). Also, under Section 115, State and Local Standards and Measures, each state is required to appoint a State Committee of Practitioners which includes membership from organized labor, business, community-based organizations, and private industry councils. Section 116 stipulates that the

Table 1.17

Policy Changes Providing for Site-Based Management and Parental Choice[a] NAVE Surveys of Public Secondary School Districts (Version B Questionnaire) and Secondary Vocational Districts

Policy Area	Occurred over 5 years ago	Occurred in past five years	Is likely to occur in coming year	Has not occurred, not likely
Public Secondary School Districts				
Implementation of site-based management	04.0	29.3	35.3	31.3
Establishment of parental choice plan	01.8	16.2	20.1	61.9
Public Secondary Vocational School Districts				
Implementation of site-based management	04.7	28.5	35.6	31.2
Establishment of parental choice plan	02.8	14.1	28.1	55.0

[a] Numbers indicate percent of responding districts selecting each choice. Secondary school districts data are population proportion estimates based on weighted sample.

required state assessment include an assessment of the relevance of programs to the workplace and to the occupation for which students are to be trained. The extent to which such programs reflect a realistic assessment of current and future labor market needs, including needs in areas of emerging technologies as well as basic and higher order current and future workplace competencies which will reflect the hiring needs of employers, must also be included in the State assessment.

Perkins II, under Title III, provides for special programs funding related to institutional integration including, Part A (Community-Based Organizations), Part D (Business-Labor-Education Partnerships for Training), Part E (Tech-Prep Education) and Part G (Community Education Employment Centers). Perkins II, (Title IV, National Programs, Part B, Demonstration Programs), Section 413, provides funding for demonstration centers for the retraining of dislocated workers. Section 416 of this same title, provides grants to industrial trade associations and/or labor organizations for the operation of business-labor-education technical committees whose purpose is to propose national standards for industrial and trades competencies.

The NAVE surveys provide information on certain areas relevant to the general goal of greater integration of vocational education with employers and organized labor. The majority of public secondary school districts and schools surveyed responded that interactions with business and industry increased within the last year. Of the responding school divisions, 49.5% reported either some or a large increase (Version A Questionnaire), 56.2% (Version B Questionnaire); and 82.4% (Vocational School Divisions). Among individual schools surveyed, 63.8% reported either some or a large increase in interactions with business and industry. Respondents rated the extent to which they agreed with the statement, "Local businesses and industry are very supportive of your district's vocational education programs." Responses were: local secondary school districts (Version B Questionnaire), 15.6% strongly agree and 48.4% agree; local secondary vocational districts, 49.3% strongly agree and 43.8% agree; local secondary schools, 23.6% strongly agree and 48.5% agree. When asked their extent of agreement with the statement "Vocational teachers in this school are motivated by a clear knowledge of what local employers need," 17.9% of local school respondents marked strongly agree; 55.3%, agree.

Respondents reported whether they had expanded, reduced or made no change in cooperative education/work experience programs. Almost 30% (29.9%) of the responding secondary school districts (Version B Questionnaire), 65.2% of vocational districts, and 38.7% of two-year public post-secondary institutions reported expanding such programs. Twenty-six percent of secondary school districts (Version B Questionnaire), 26.0% of secondary school districts, 42.0% of secondary vocational districts, and 53.7% of two-year postsecondary institutions reported they had added or expanded job placement activities.

Finally, in response to a particular requirement of Perkins II, respondents rated the extent to which their state had provided assistance during 1991-1992 in developing curricula which include "all aspects of the industry." Approximately half (48.7%) of the secondary school districts responding to Version A Questionnaire, 49.9% responding to the Version B Questionnaire, and 53.9% of the secondary vocational district respondents indicated little or no support for such development.

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CHAPTER 2

CONTEXTUAL LEARNING: A REVIEW AND SYNTHESIS

Nancy Karweit

INTRODUCTION

The decade following the appearance of A Nation At Risk[1] witnessed the initiation of wide-scale school reform efforts. The first wave of reform sought to improve the productivity and efficiency of schools through a variety of reforms, such as increasing the amount of instructional time and increasing the requirements and rigor of student coursework.

Recent calls for reform of the nation's schools have urged more far-reaching changes than those suggested in the first wave of reform following the Nation At Risk report. These newer challenges call not just for more efficient schools, but for fundamentally different ones as well. These more recent reform efforts call for rethinking schools, not merely rearranging them.

This new reform springs from several different trends. One particularly important impetus for change is the recent empirical and theoretical work in the area of cognitive science. Findings from this new area are claimed to call into question the principles upon which the organization and operation of traditional schooling is based. In particular, findings from this new research challenge the validity of the notion of a skills hierarchy and the generality of basic skills.

These two principles assume that (a) competencies can be decomposed into constituent parts, or subskills, that can be learned and then put back together and the competency will be acquired, and (b) individual skills can be taught out of context on the assumption that they can then be applied appropriately in context. The rationale for the operation and organization of traditional schooling derives to a large extent, it is argued, from these two principles. The practice of sorting students into tracks and grades, derived from the need to efficiently focus on the mastery of basic skills, for example, is argued to be a consequence of these two assumptions.

However, recent research, in particular the research on novices and experts, calls into question the view of expertise as the accumulation or mastery of basic, decontextualized skills. Rather, expert performance is thought to depend upon skills that can be viewed as generalizable as well as skills that are very situation specific.

More generally, the traditional view of learning as abstract and generalizable is being challenged by a view of cognition as situated and specific. Rather than seeing knowledge as something that is true for all time and all place, knowledge is seen as dependent upon and embedded in the context and activity in which it is acquired and used. Traditional schooling, by abstracting knowledge from use, in an attempt to promote generalizability, creates inaccessible and unusable knowledge.

If the abstract nature of schools and instruction is the problem, then an appropriate solution involves making schools and learning less abstract, i.e. integrating the specific and general, or applied and theoretical.

Calls for experiential and integrated curricula are certainly not new. However, this visit to the topic, it is suggested, is accompanied by a new evidential base, incorporating studies of experts and novices, practical intelligence and situated cognition.

The current answer to what is in need of reform in the nation's schools includes attention to context, situation and real-life applications. This emphasis takes many forms, from initiatives that integrate vocational and academic education to classroom practices that bring in and incorporate real work examples. We call these efforts to reconnect learning to use, to acknowledge the situated nature of learning and to incorporate real world examples into activities *contextual learning*.

This paper examines the theoretical and empirical base for contextual learning, paying particular attention to the question of the generality or specificity of cognitive skills. The paper describes several examples of contextual learning and examines and critiques the available evidence of the learning consequences of these examples.

COGNITIVE SCIENCE PERSPECTIVE

The arguments concerning the situated nature of cognition and the context specific nature of knowledge have been developed through studies in the newly emerging area of cognitive science. This section briefly summarizes six main elements of this perspective.

Cognitive science incorporates research from several different disciplines, including anthropology, sociology, psychology, information and computer sciences. In the contemporary cognitive science, anthropologists explore the cultural basis of cognitive functioning, sociologists examine the social distribution of cognitive skills in various groups, psychologists focus on individual cognitive ability, and other specialists focus on various aspects of cognition.[2]

Cognition as Knowledge and Process

An important contribution of cognitive science is the understanding of the dual nature of cognition. Intellectual activities comprise **mental processes** to acquire knowledge as well as the **knowledge** acquired. Studies of experts and novices shed light on the important role of both content knowledge and metacognitive strategies in expert performance. The practical importance of these findings is that it points out the twin importance of processes and the knowledge.

Cognition as Situated

Rather than seeing knowledge as generalizable and abstract, this perspective emphasizes the **situated nature** of cognition. Knowledge is not independent of the context in which it is acquired. Studies of knowledge in use and practical intelligence, as well as studies of transfer (or lack of it), support this aspect of the theory. In addition, studies of practical intelligence reveal how features of the environment are incorporated into the problem space itself, another way in which cognition is not independent of context.

The Structure and Organization of Knowledge

Studies of experts and novices also indicate that experts and novices organize information in different manners. Experts' greater knowledge of the subject matter allows them to organize information around central principles or to chunk substructures or patterns around goals or solutions. In addition, experts are more likely to monitor their performance than are novices.

The computer science perspective suggests an architecture of human cognition in which the mind is considered to have a short term and a long term memory. The capacity of working memory is limited. But this capacity can be expanded if students automate some of the mental processes that typically take place in short term memory. In the case of beginning reading, Sticht and McDonald[3] suggest that novice readers face difficulties with reading because their short term memory is overwhelmed with decoding tasks, leaving inadequate processing space for accessing knowledge that would help comprehension.

The Nature of Cognitive Development

Traditional views of intelligence suggested that intelligence was a one dimensional construct transmitted genetically as potential for learning. The cognitive science perspective suggests a dynamic view in which intelligence is multifaceted and evolving in interaction with the environment. This shift moves the view of intelligence away from a potential, innate view of human intelligence to an interactionist, developing view. As Sticht and McDonald explain, "While genetics determine the anatomical structures and physiological

functions that make the individual capable of cognition, society and culture provide the most important resources for human cognitive development.... It is through the value placed on certain skills by one's social group that members are motivated to learn."[4] Rather than viewing potential as a trait residing totally within the individual, this new view holds that social expectations and values develop **within the social context.**

Socially Constructed Knowledge

In contrast to the older views that stressed nature vs. nurture, the cognitive science perspective, influenced by sociohistorical views of mind, followed a new perspective on the basis of mind. This new perspective focused on mind as determined by culture and society.

It is through the teaching of parents and other members of the community that the child comes to understand the world in which he lives. Because the knowledge and skills will come to reflect those of the particular group in which the child is raised, the cognitive skills will incorporate the knowledge and ways of thinking of the culture. It is in this way that knowledge is socially constructed.

Constructivism

A fundamental assumption of the constructivist position is that students are active constructors, not passive recipients of knowledge. Students learn by participation in in-depth interaction in a meaningful way with their ideas and knowledge.[5] Knowledge acquired through active involvement and participation is more likely to be accessible and usable; knowledge acquired via transmission is likely to remain inert.

GENERAL AND CONTEXT-SPECIFIC KNOWLEDGE

An essential thesis in the cognitive science perspective is the context-specific or situated nature of cognition. Resnick[6] contrasts the differences in knowing between two important contexts, that of "in" and "out" of school. Referencing the literature that documents that students are often able to perform tasks outside of school that they cannot perform in school, Resnick suggests four specific features of the traditional schooling context that are dysfunctional for learning.

First, the dominant form of learning in schools is individually arranged, while in work or out-of-school settings, learning is a shared enterprise. Schooling is by and large organized as an individual activity where assignments and rewards are individually made while outside of school, tasks are primarily collaborative.

Second, schools place a large emphasis on the demonstration of student performance without the assistance of resources, such as books, calculators, and other people. These resources are routinely utilized in out of school settings.

Third, schools assume a view of learning that heavily emphasizes abstraction and symbol manipulation. Resnick interprets studies of practical intelligence and cognition in everyday life to suggest that mental activities make sense in terms of their results in a specific circumstance. Or, as she states: "actions are grounded in the logic of the immediate situation". From this situated learning perspective, the problem in classroom learning is that the symbols are detached from their real world referents. The instruction has no meaning for the student because it lacks a concrete, relevant referent.

Finally, Resnick claims that another dysfunctionality of schooling is that schools, in contrast to the rest of the world, focus on the acquisition of generalized learning. Schools aim to teach general skills and theoretical principles on the assumption that once acquired these skills can then be utilized in a wide variety of settings. However, studies of expert performance indicate that expertise does not come about primarily from the application of general skills, but involves the use of situationally specific, relevant knowledge. Schools are dysfunctional because the general skills they try to teach have no actual use in the real world.

Resnick's arguments about the generality and specificity of skills have been very influential. Because of their importance, we focus on the argument in some detail.

Generality of Skills

Resnick suggests that the assumption of the generality of skills is the backbone of traditional academic teaching. Countless hours are spent drilling students in the basic skills, argued to be useful and essential for all time and place. The generality of skills assumption is challenged, however, by the work in cognitive science on experts and novices, by examination of knowledge transfer from one situation to another, and by the development of a theory of situated cognition.

Experts and Novices

Studies of experts and novices suggest that expertise involves not just knowledge of abstract general rules as was once thought, but also a great deal of specific knowledge. In contrast to what was initially thought, expertise involves a great deal more than simply applying general heuristics.[7] For example, expert chess players utilize richly developed knowledge of specific chess situations. Novice players are more likely to concentrate on general

heuristics; expert performers use domain specific knowledge and general rules. Importantly, experts know how and when to use what they know. Knowledge of rules and procedures by itself is not sufficient; one has to also know when and how to apply this knowledge. Knowing the conditions of application seems to be a particularly difficult skill for students in school to acquire. Students can learn a procedure or fact, but are very unlikely to apply it or recognize when it may be useful to use. They remain novices because the conditions under which they might apply domain knowledge are never explained, or can not be fully appreciated. The recent renewed attention to real life applications focuses on reconnecting knowledge to use so that students can acquire or attach an understanding of conditions of applications to a concept or procedure.

Transfer

Another premise of the generality of skills argument is that skills acquired in one setting can be readily transferred into other settings. In actuality, the conditions of transfer may be quite limited. Perkins and Salomon[8] propose two specific examples when transfer takes place. One they call the "low road" to transfer, or the situation in which there is stimulus generalization due to practice to automaticity. An example is driving a car in which the skill transfers to varied vehicles and circumstances. The "high road" to transfer is when learners make a deliberate abstraction of a principle by decontextualizing it from one situation and applying it in another. The evidence that this type of transfer occurs is less clear. In fact, transfer of this sort is argued to occur under very specific conditions that are not often met in everyday life or in laboratory situations.

Detterman and Sternberg[9] succinctly summarizes the view of transfer:

> Transfer has been studied since the turn of the century. Still there is very little empirical evidence showing meaningful transfer to occur and much less evidence showing it under empirical control...significant transfer is probably rare and accounts for very little human behavior. Studies that claim transfer often tell the subject to transfer or use a 'trick' to call the subject's attention to the similarity of the two problems. Such studies cannot be taken as evidence for transfer..."

Detterman and Sternberg[10] go on to conclude that "thinking, at its most effective, depends upon specific context bound skills and units of knowledge that have little application to other domains."

Pressley and Yokoi[11] argue that Detterman's verdict is far too pessimistic and fails to consider the full range of evidence on the transfer issue. As counter example, they suggest that useful transfer has been demonstrated to occur in the application of procedural knowledge in new situations.

Brown, Kane and Long[12] provide one such example of transfer. They document that children are able to transfer what they learn if the situation is designed to promote transfer. Of particular importance is helping students to understand when to apply the procedures, or in developing procedural knowledge.

Situated Cognition

The argument that knowledge is situationally specific is a key element in the critique of traditional schooling. The situation or context is not seen as something external to events and something that exerts an influence on events, but as inseparable and dynamically connected with events.

As Rogoff phrases it: " I regard context as inseparable from human actions in cognitive events or activities. I regard all human activity as embedded in context; there are neither context-free situations nor decontextualized skills."[13]

This intrinsic connection between activity and context is seen as a dynamic one. That is, rather than conceptualizing context as a static aspect of the environment that influences action, action and context are seen as mutually defining. This view suggests that the appropriate point of view for understanding context is with the individual and actions in context.

This perspective on context and actions is echoed in the discussion of situated learning by Greeno, Moore and Smith.[14] They argue that knowing is fundamentally situated, meaning that knowing is relative to situations. One does not know something for all times and all places, but knows something in context. The people and other elements in the setting are part of the situation in which knowledge is embedded.

The authors provide an analogy from physics. Physicists acknowledge that motion is not a property of an object. The description of a moving object therefore depends upon a frame of reference. Motion is defined in the relation to the object and the frame of reference. It makes no sense to try to describe motion without reference to this frame.

Greeno, Moore and Smith[15] argue that in a similar way, cognitive activities must be considered relative to their frame. It is therefore "not meaningful to try to characterize what someone knows apart from situations in which the person engages in cognitive activity."

Characterizing the situation involves focusing on the physical, mental and social aspects of the environment.

Brown, Collins, and Duguid,[16] in an important article discussing the nature of situated cognition explain that:

> The activity in which knowledge is developed and deployed ...is not separable from or ancillary to learning and cognition. Nor is it neutral. Rather, it is an integral part of what is learned. Situations might be said to co-produce knowledge through activity. Learning and cognition are fundamentally situated."

Discontinuities in performance across contexts. Support for this view of situated cognition is provided by studies that suggest that discrepancies in performance exist across differing contexts. Studies of knowledge use in and out of school document these discontinuities in performance across settings.

Carraher, Carraher and Schliemann[17] studied everyday math in the street markets of Recife, Brazil. They found that children in these street markets made complex, accurate and efficient calculations. However, when asked to carry out the same calculation in a decontextualized, formal way, they could not. The differences in proficiencies are suggested by the example below: (M is the vendor, the customer is the interviewer.)

> Customer: How much is one coconut?
> M: 35
> Customer: I'd like ten, how much is that?
> M: (Pause) Three will be 105; with three more, that will be 210 (Pause). I need four more. That is (pause) 315...I think it is 350.

In solving this problem, the vendor solved several separate problems, including 3 X 35 (known), 105+105; 210+105, 315+35; 3+3+3+1.

To see if there were differences between the formal and situated contexts, the interviewer constructed a test based on the skills that the vendor had successfully used in solving the task. There was little correspondence between performance in these two contexts. Baffled by these results, the authors ask: " how is it possible that children capable of solving a computational problem in the natural situation will fail to solve the same problem when it is taken out of context?" They suggest that in the natural setting, children are making calculations made on quantities, but in the formal situation, they are required to work with abstract symbols. This would suggest that the process of abstraction and the reliance on symbols is a primary difference between the two settings.[18]

In another study, Carraher examined how construction workers and eighth grade students solved scale problems on architectural drawings. The construction workers, who had daily experience with scale drawings and an entrenched experiential base on which to test the sensibleness of their conclusions, outperformed the students on these tasks. The students were all

knowledgeable about the proportion algorithm that could be used to solve scale problems.

The conclusion drawn from this study was that the practical, contextualized knowledge was much more reliable than the abstract algorithm alone. However, when faced with an unfamiliar scale, i.e. one that they did not use in actual practice, the worker's accuracy dropped below or was comparable to the students.

Another example of the discontinuity in performance across settings is cited by Lave.[19] A junior high teacher, Herndon, who taught remedial eighth grade students, documents how his students could perform numerous calculations in everyday life, but failed to transfer this ability into the formal class setting. Most of his students engaged in complex arithmetic either as shoppers or in after school jobs. For example, one student had a regular job as a scorer for a bowling league that required him to carry out fast and accurate arithmetic. Herndon decided that what he needed to do was to "contextualize" the math by bringing in an example from everyday life into the classroom.

> I lectured him on how smart he was to be a league scorer in bowling. I pried admissions from the other boys, about how they had paper routes and made change. I made the girls confess that when they went to buy stuff they didn't have any difficulty deciding if those shoes that cost 10.95 or whether it meant 109.50 or 1.09 and what change they would get back from a twenty. Naturally, I handed out bowling score problems and naturally everyone could choose which ones they wanted to solve and naturally they all rushed me yelling, Is this right? I don't know how to do it! What's the answer? This ain't right is it and "What's my grade?" The girls who bought shoes for 10.95 with a twenty dollar bill came up with $400.15 for change and wanted to know if that was right? The brilliant league scorer couldn't decide whether two strikes and a third frame of eight amounted to eighteen or twenty eight or whether it was one hundred eight and a half.

One reason that the performance of people in every day settings tends to be accurate is that they use features of the context in creative ways to simplify calculations and reduce the work load. This ability to use the context to aid in the task, or contextualized reasoning, is considered next.

Contextualized reasoning. In everyday situations, individual problem solvers not only use experience to monitor answers and accuracy, but to modify the algorithm or way of arriving at the answer to the situation. De la Rocha[20] provides an intriguing example. Participants in Weight Watchers, where precision in measurement is important, avoided the complexity of precise measurement by creating strategies that made their use unnecessary. Faced with the necessity of taking three quarters of two thirds, rather than carrying

out the actual calculation, the participants took two thirds of a cup, then patted it into a circle and divided the circle into quarters, thus avoiding the necessity to stop, make a paper and pencil calculation and disrupt the food preparation. The approach used depended upon the context, the circumstances and constraints of the situation.

The situation in which problem solving takes place is not simply a frame for understanding action, but a part of the problem space itself. That is, the context is not seen as something that one must control or statistically account for, but is seen as an integral part of the problem space and event itself. Context serves to define and embed the particulars of the learning situation. Contextualized reasoning uses features of the problem solving situation to make the problem easier or to avoid complexity. The performance discontinuities between school and real life depend upon the ability of the problem solvers to use features of the situation in problem solving.

Teaching is too Abstract

One of the critiques of classroom instruction is that it is too abstract, too focused on symbol manipulation. The street vendors and the adults in Lave's study are argued to have superior accuracy in real life settings in part because they are manipulating not the abstract symbol system but actual quantities.

It is interesting, however, that attempts at making math instruction more concrete by the introduction of specific manipulables has not necessarily increased its accuracy.[21] For example, elementary school children typically find it difficult to accurately borrow by renaming. One way to assist this task is to make it more concrete by using manipulatives such as Dienes blocks. Dienes blocks represent quantities in such a way that their physical size corresponds to their amount. That is, ten "ones" all put together are the same size as one ten, thus when renaming, the correspondence in size helps make the exchange sensible.

However, studies of student's accuracy suggest that Dienes blocks do not in fact increase accuracy. Despite the apparent mastery of the Diene's blocks, there were persistent errors in the student's performances.[22]

Assumption of a Skills Hierarchy

Elementary school students spend many hours working on basic skills in reading, writing and arithmetic. An assumption of traditional teaching is that these basic skills must be mastered before tackling the more complex ones of problem solving, writing expository text or making sense of a reading passage. The difficulty is that many students never get beyond the drill and skill on the basics to more advanced applications.

Research on learning in and out of school suggests that students can carry out tasks that are well beyond what they can formally demonstrate. This demonstration challenges the existence of a skills hierarchy. Another challenge to the importance of building on basic skills was the developing view of the situated nature of learning. One justification for spending so much time on the basic skills is the view that they were generalizable and true for all time and place. The view of cognition as situationally dependent makes this view difficult to uphold.

Another issue with the skills hierarchy is that it implies a learning curve shaped by mastering block after block of skills, i.e. a linear growth curve. But, learning is probably more erratic than this assumption predicts, with lulls in the growth curve due to periods of integration and knowledge consolidation or even lapses due to confusion before clarity.

Finally, it isn't at all clear where simple skills leave off and complex skills begin. What is simple and what is complex and how are they related?

The argument against a skills hierarchy notion comes both from studies of practice in use and from observations of learning in classrooms. Young children, for example, can clearly use writing to communicate well before they master conventional spelling and punctuation. Similarly children can comprehend story structure and analyze character traits and make predictions and inferences well before they can actually read a story. These examples suggest that demonstration of "higher order skills" may precede or coexist with " learning basic skills".

COGNITIVE APPRENTICESHIPS

Collins, Brown and Newman[23] extend this view of the differences between learning in "in" and "out" of school contexts in their discussion of cognitive apprenticeships. They contrast schools, in which skills and knowledge are abstracted from their usages in the real world, with apprenticeships, in which skills and knowledge are embedded in their social and functional contexts. They suggest that this disconnection of learning from the context of use is most problematic in traditional schooling. Apprenticeships serve as a model for a learning environment in which knowledge and use are meaningfully connected. They term such a model of learning cognitive apprenticeships.

A fundamental problem of school learning that may be addressed by cognitive apprenticeships is that of inert knowledge. Inert knowledge is the situation in which the student knows something but is unable to use this knowledge. One reason for this condition in the failure to understand the conditions of application. Failure to understand the conditions of application results in part from the way schools organize and deliver instruction. By abstractly presenting skills without also presenting multiple real life contexts for use, schools help

create conditions for inert knowledge. Collins, Brown and Newman maintain that students (similar to other novice performers) acquire conceptual and problem solving knowledge, but do not apply it because they lack the experience or know-how to activate this knowledge in a different setting. Because skills may be acquired without sufficient understanding and appreciation of their utility, they are not utilized. It is the ability to understand the conditions of use, as well as the conceptual knowledge, that distinguishes experts from novices.

These authors suggest that there are two central issues in framing an effective learning environment: the need to understand expert practice, and the need to devise methods appropriate for developing that practice. In this situation, knowledge and processes are important, not simply general abstraction and low-level procedural knowledge. Cognitive and metacognitive skills, then, are the "organizing principles of expertise". The duality of cognition means that knowledge is important as are the metacognitive skills that help guide the acquisition and use of that knowledge. Both knowledge and know-how are critical for expertise. Because expert practice depends upon the integration of metacognitive and cognitive functioning and strategies, the method of teaching might best look like "successive approximation of mature practice". The educational model that best approximates this successive approximation is apprenticeship.

The process of gaining experience in apprenticeships is one of observation, coaching and practice guided by experts as the apprentice learns particular skills. The apprentice, immersed in a community of skilled practice, has many opportunities to observe the skill in use in a variety of contexts. He thus learns generality by observation and experience of particulars. Coaching, in the form of providing support and reminders, helps the apprentice approximate the skill. As mature skills develop, this support from experts fades. The connection between observation, support and fading while the novice carries out increasingly mature practice helps develop self monitoring skills that are needed to move from novice to expert. Cognitive and metacognitive skills are developed jointly and reciprocally.

This traditional model of apprenticeship, then, serves as a framework for developing a model of cognitive apprenticeship for developing expertise in reading, writing and mathematics. The model is aimed at teaching processes used in complex problem solving with a specific recognition that apprenticeships are not the only needed instructional model. Cognitive apprenticeships, then, are argued to be best suited to facilitate expert practice through situated learning and the acquisition of cognitive and metacognitve skills. The key here is to provide contexts (situated learning) that facilitate the acquisition of expertise, i.e. the connection and use of necessary cognitive and metacognitive skills. Several additional aspects of the apprenticeship system facilitate this development. The ability to reflect on one's performance by

having models of expert performance as well as models of developing expertise is important.

They enumerate the components of an ideal learning environment, i.e. those necessary elements to approximate cognitive apprenticeships. These are listed in Figure 1 along with a brief description of the salient features of the model.

Content refers to several types of knowledge, in particular the procedural, factual and conceptual knowledge on the one hand and strategic knowledge on the other. Expertise is seen to depend upon all four aspects of knowledge. Schools typically focus primarily on domain knowledge. Method describes the way that apprentice-ships can help students acquire and integrate cognitive and metacognitive strategies for using, managing and discovering knowledge. Sequencing pertains to the manner in which instruction proceeds to promote integration and generalization. Finally, sociology refers to the social organization of the activities in the learning environment.

Cognitive apprenticeships, then, provide appropriate learning environments, given the situated view of cognition. That is, cognitive apprenticeships help support situations conducive to contextual learning.

CONTEXTUAL LEARNING

This section describes several examples that incorporate specific features of the cognitive apprenticeship model and discusses evidence of effectiveness of these approaches. The examples were selected because they incorporate several features of the cognitive apprenticeship model. Some detail is presented on three instructional models that incorporate several elements (Reciprocal Teaching, Anchored Instruction and Functional Context Learning). Next, we highlight some specific examples of practices or curricula that focus primarily on changes in the content of instruction by providing more authentic and challenging learning tasks.

Reciprocal Teaching

Palincsar and Brown[24] developed Reciprocal Teaching (RT) to improve the reading comprehension of seventh grade students who showed poor comprehension abilities. Reciprocal Teaching incorporates strategies in which the teacher models expert practice for the student. Referring to the cognitive apprenticeship model, Reciprocal Teaching particularly emphasizes the methods of instruction.

Two studies by Palincsar and Brown establish the effectiveness of this approach. In the first study, Palincsar was the teacher and the setting was one-on-one instruction. The second study used volunteer teachers in regular classrooms with regular reading groups.

Figure 1

Components of Ideal Learning Environment

Content	Methods	Sequence	Sociology
Domain knowledge conceptual factual procedural Heuristic strategies Control strategies (managing problem solving) Learning strategies (improving learning strategies)	Modeling externalization of internal processes and activities Coaching interactive and situated feedback Scaffolding support in cooperative problem solving task Articulation present understanding Reflection compare problem solving process with other students Exploration culmination of fading of supports, working on own	Increasing complexity construction of sequence of tasks and task environments where more and more of skills necessary for expert performance are required Increasing diversity construction of a sequence of tasks in which a wider and wider variety of strategies or skills are required Global before local skills see purpose of whole, put together, use entire thing before work on its parts	In context learning learn skills in context of application of realistic problems Situated learning understand purpose active learning application conditions learn multiple contexts Culture of expert practice models of expertise in use teach how to think like an expert focus interaction learners and experts Intrinsic motivation functionally creates motivation Exploit cooperation sharing knowledge and skills Exploit competition making errors not negative

Source: Collins, Brown, and Newman (1989)

Reciprocal teaching incorporates four strategic activities: summarizing (self-review); questioning; clarifying; and predicting. Both studies utilized a 4 group design in which group one participated in reciprocal teaching, group 2 was involved in a method called locating information, that mirrored the typical practice for remedial students, group 3 was a test only condition utilizing daily assessments, and group 4 was an untreated control group that was given pre and post tests only. There were six students in each group. The experiment lasted for 20 teaching days. The percent correct on comprehension questions /on the passages read measured student performance. Average readers scored about 75 percent accurate. The below average readers (all the treatment groups) scored significantly below this at baseline, typically in the 30-40 percent range. The RT group improved over the course of the training to the level of the average readers, but the other groups did not show this improvement. The results show striking differences for the RT group in this study ($p<.001$).

In addition, there was evidence of the transfer of these competencies to other subject areas as the students in RT also showed gains in comprehension in social studies and science. Finally, there was evidence that four of the six students gained appreciably on the standardized reading test measures of comprehension given three months after the study.

Reliable maintenance of these effects over time was found with students still at the 60 percent correct level after six months. Study 2 utilized regular teachers who received 3 training sessions. The results from study 2 appear to be similar to study 1. The profiles of student comprehension for example show students achieving 40% accuracy at baseline and then improving to 70-80 percent. Similarly, study 2 was found to have an effect on transfer tests, summarizing, predicting questions and detecting incongruities.

These studies indicate: (a) qualitative evidence of improvement in student's dialogues (b) large and reliable improvement on comprehension tasks, (c) maintenance of effects after 8 weeks, (d) generalized effects to classroom settings, (e) reliable transfer to other tasks, 6) sizeable improvement in standardized comprehension tests,(f) success in natural experiment, and (g) teachers' enthusiasm for the procedures.

Rosenshine and Meister[25] reviewed nineteen experimental studies that have been conducted subsequently using Reciprocal Teaching as a strategy. The reviewed studies comprised two different types of treatments, those using explicit teaching and reciprocal teaching and those using reciprocal teaching only. Ten of the nineteen studies belonged to the explicit teaching and reciprocal teaching category (ET/RT). Other important factors include the achievement level of the student and the type of test (standardized achievement and developer made). Across these studies, the results were evenly distributed between non-significant and significant results, with an

average effect size of .52. On average, there were larger effects detected when explicit teaching accompanied reciprocal teaching (effect size of +.60 vs +.34). The effects were roughly comparable across student achievement level. The type of test also greatly influenced the results. Experimenter developed tests had an average effect size of .87 while standardized tests had an average effect size of +.32. These results indicate: (a) Reciprocal Teaching is effective, (b) explicit teaching of strategies along with Reciprocal Teaching enhances outcomes, both on the developer-made and on the standardized tests.

It is not clear which of the four strategies might be particularly important for achievement, although some work finds utility in summarization and main idea generation and in "fix-up" strategies when one fails to comprehend the text.[26]

Anchored Instruction

Anchored Instruction, developed at Vanderbilt University by the Cognition and Technology Group, situates instruction in the context of meaningful problem solving environments. These environments, or anchors, allow in-the-classroom simulations of "in-context" apprenticeship training. Anchored Instruction provides a meaningful context for learning by creating problem solving situations that approximate real, not contrived, situations.

Learning environments are created on videodiscs that permit "sustained exploration by students and teachers and enable them to understand the kinds of problems and opportunities that experts in various areas encounter and the knowledge that these experts use as tools. We also attempt to help students experience the value of exploring the same setting from multiple perspectives (e.g. as a scientist or historian)".[27]

The videodisc approximates authentic problem solving situations. This provision of a relevant context or anchor is seen to be critical in combatting the problem of semantics and of inert knowledge. Students may learn a procedure, but fail to use it because they did not recognize its utility in a different situation. For example, students are told that logarithms are useful so that addition rather than multiplication can be used, but because they have not had the experience of having to solve problems that require repetitive multiplication and accuracy, they often fail to appreciate the enormous utility of this tool. The problem is not that teachers don't try to make it meaningful, but that the nature of the instructional setting doesn't allow students to appreciate the usefulness of a specific tool or procedure.

There are several different anchors that have been developed. We describe the *Jasper Series* that focuses on mathematical problem formulation and problem solving. Jasper Woodberry is the main character in a series of adventures that serve as a context for problem solving. An important design feature of the series is an "embedded data design" in which students have to generate the

problems to be solved and then have to find relevant information presented in the videodisc.

The Jasper Woodberry Problem Solving Series is a set of video-based adventures that provide a motivating and realistic context for problem solving. The learning goals are the development of independent thinkers and learners. A critical element is the ability of students to identify issues and problems on their own. The capacity of students to use knowledge generatively is stressed -- to be called up over and over again as ways to link, interpret and explain new information.[28]

Each adventure is a 15-20 minute story. At the end of each story, the major character is faced with a challenge that the students in the classroom must solve before they see how the movie character solved the problem.

Below is an overview of the first Jasper adventure.

> In the first scene, we meet Jasper and learn that he is going to Cedar Creek to look at an old cruiser that he is interested in buying. He sets out for Cedar Creek in his little motorboat. On the video, Jasper is shown consulting a map of the area, listening to his marine radio, and so forth. As the story continues, Jasper stops at Larry's dock. He leaves Larry's after buying gas with his only cash - a twenty dollar bill - and sets out up river. He runs into a bit of trouble when he hits something in the water and breaks the shear pin of his propeller. Jasper rows to a repair shop where he pays to have the shear pin replaced. He finally reaches Cedar Creek boat dock where he locates Sal, the cruiser's owner. He and Sal test drive the cruiser and find out the boat's cruising speed. They return to the dock where they fill the cruiser's gas tank (it is an old cruiser and the tank is a small, temporary tank that is being used until the real ones are fixed). Jasper decides to buy the cruiser and he and Sal conclude the transaction.
>
> At the end of the video we see Jasper asking himself when he needs to leave and whether he can make it home without running out of gasoline. At this point students are challenged to engage in the problem-finding and problem- solving activities that were mentioned earlier. Students must identify Jasper's major goal (to get home before sunset without running out of gas) and the major obstacles to that goal (e.g. running out of gasoline) and devise strategies to deal with various subproblems.

The research on the Jasper series indicates that students learn more from video instruction than from traditional instruction of the same content. The

evaluations generally suggest that "Jasper-taught students are more adept at the higher order reasoning skills involved in complex mathematical problem solving than students who receive traditional instruction and practice on story problems. They are better able to generate and logically evaluate plans for solving complex problems and they are also more successful at solving problems."[29] Several distinct evaluations of Jasper have been carried out. We focus here on the results of the 1990-1991 evaluation.

The student population that participated in the program came from 37 classrooms in 11 districts. A matched sample with control group design was employed in 5 of the districts, with a total of 20 classrooms (10 matched and 10 control). The matches were made on the standardized reading and math scores from the previous years test administration. In the experimental condition, the students received instruction in a minimum of three Jasper adventures. These activities took the time that normally would have been devoted to word problems. They developed test instruments to specifically test the outcomes of participation in the areas: Basic Math Concepts, Word Problem Test, Planning Test, and Math Attitudes Questionnaire.

Basic math concepts: Both the experimental and the matched control group improved during the year and at about the same rate. There were no differences in this test. However, because the series does not focus on specific development of basic math concepts, it wasn't expected that there would be differences.

Word problems: The Jasper students had superior performance on this test that included one-step, two-step and multi-step problems.

Planning problems: Experimental planning problems were created that involved generating the subgoals needed to solve complex problems. At the beginning of the year, both groups had considerable difficulty with this task. At the end of the year, however, the Jasper group score was significantly different than the control on these measures.

Attitudes: Math attitudes were assessed by a 35 item questionnaire that was turned into three general categories: attitudes toward math, attribution and exploratory scales. In the attitudes toward math, they examined the math ability, self-confidence, utility, interest and feelings about liking challenging problems. On 4 of the 5 attitudes (not on rating of math ability) the Jasper student's performed significantly better than did the controls.

There are many aspects of the traditional classroom setting that are altered by the use of the Jasper series. Additional studies that isolate the components that are effective are needed. For example, challenging, authentic tasks might bepresented in a text and in a video to determine the effect of the format as opposed to the task itself.

Functional Context Education

Functional context education (FCE) has been widely used in military training over the last thirty or so years. A recent statement of the concepts in FCE is provided by Sticht, Armstrong, Hickey and Caylor[30] and Sticht, Beeler and McDonald.[31] The two basic ideas are (a) make instruction meaningful by relating it to existing knowledge, and (b) use real life examples or situations and materials that the learner will encounter after training.

Functional Context Approaches to Literacy

The emphasis on sequencing instruction from concrete to abstract and on focusing on real life applications was incorporated in the development of literacy programs in the military that followed this functional context training model. The Functional Literacy (FLIT) project in the Army provides an example of this approach. The basic skills needed to perform each task in various job areas were developed (cook, clerk, communication combat, mechanic and medic) and a six week course was developed that focused on two modules, reading-to-do and reading-to-learn. The reading-to-do module emphasized strategies to use when searching materials for information (using table of contents, using an index, etc). The reading-to-learn taught reading comprehension strategies using materials that the recruits would encounter on the job.

The development of the Functional Literacy Program in the Army was based on concepts that stressed a psycholinguistic theory of reading and an information professing theory of learning.[32]

The psycholinguistic approach was based on a developmental sequence in the acquisition of reading skills. This developmental sequence was not seen as some innate, biological stage, but as the expression of the normative expectations for literacy behaviors for people at different ages. Acquiring literacy was seen as a lifetime project, not something completed by a certain age. Societal conventions and expectations for what it means to be literate at a certain age define the developmental sequence. The information processing model emphasized the active internal mental processing of the learner and saw learning as an active constructive process.

The Army developed FLIT because of the failure of their traditional, school-like literacy programs. Time constraints also were an important consideration. They needed to adequately train students in six weeks, in six hour per day sessions during wartime.

The program focused the reading on the contents of the job field for which the trainees were being prepared. In this way both job knowledge and reading skills were developed.

The six week session was designed to take place prior to job technical training. The FLIT program developed literacy programs for specific areas (Cooks, Automobile Repairmen, Communications Specialists, Medical Corpsmen, Combat Specialist and Supply Specialists).

To ensure that the program was selecting only those recruits who truly needed to be in the program, the recruits were tested on three separate occasions.[33] The test used at exit contained samples of reading both in the specific job and in the other fields, thus addressing the generalizability of the training. High generalizability across fields was thought to be likely because many of the words (about three-quarters) were general words, not job specific words.

The FLIT Curriculum

The FLIT curriculum consisted of two strands, reading-to-do and reading-to-learn. The reading-to-do strand focused on using manuals as reference materials. Analyses of job tasks indicated that locating, extracting and using the materials (not learning it) was an essential feature. The reading-to-do segment was developed to teach how to use table of contents, indexes, tables and graphs, etc.

The reading-to-learn strand acknowledged the importance of background knowledge in reading for meaning. The design therefore emphasized the development of the relevant knowledge base because students had sufficient skills to decode the text. Specific knowledge objectives were developed and passages written that contained that information. Redundancy was introduced into the text by having the students reread and use the text many times, not by repeating the information in the text itself.

Achievement data consisted of pre- and post-testing for general reading test and job related reading task tests. The metric that was used was a grade equivalent score. Sticht[34] indicates that the reading items were scaled into grade equivalents and cautions misinterpretation as true grade equivalent metrics. A sixth grade level on a normed test would probably indicate a broader reading base than a sixth grade level on job skills reading passage. The evaluation looks at gains in reading scores in "months". A comparison of reading gains across different treatments is the basis of comparison for program effectiveness. In comparison to groups that used a traditional literacy model, the FLIT program made "three times the gain" as did the Army General Literacy Program.[35] Despite the questionable use of gain scores on already questionable grade equivalent scores, the contrasts, made in appropriate range of variation of the outcomes, suggest that the FLIT curriculum resulted in greater gains in job specific reading and that these results are robust across sites. However, the use of the quasi-grade equivalent scores do not permit interpretation of the magnitude of the differences.

Authentic and Challenging Tasks

Computer Chronicle Newswire. Riel[36] describes the operation and effects of a writing network that integrated a computer-supported writing system, co-operative problem solving and newspaper reporting into a larger network of communications. Third and fourth graders, who were experiencing learning difficulties, participated in the program in five schools that were geographically dispersed. The classrooms generated and edited articles using the computer, stored them on floppy disks and sent them to the other classrooms.

A Computer Chronicles Prompter, an interactive writing system, helped the students decide what to write and how to organize their ideas. The students used cooperative peer writing to help with the details of the writing and computer coaches, who were university undergraduates, encouraged and assisted the students.

Pre and post test writing assignments were given to the students. The author notes that a major attitude change occurred between the pre and post testing. At the beginning, the students had complained, grumbled and generally been less than enthusiastic about the writing task. At the post-test, the students began writing right away without complaint or apparent struggle. The writings produced also indicated changes in expository writing length from an average of 53 word to and average of 79 words. There was no control group in this study, so it is not possible to know whether students similarly encouraged to write, would have also increased production and willingness to write.

This study does provide an example of ways in which writing can be carried out in a context that has the attributes of actual practice. The activity was not merely a "pretend you are writing to someone in Alaska" - they actually were - and the structure of the writing task and the use of an editorial board that criticized and selected articles made the organization of the activity have many of the same properties as actual newspaper reporting.

Project Rochester. Project Rochester[37] is one example of challenging and authentic tasks. In this project, middle school students explore and learn about their community in order to serve a real-world purpose -- a preparation of a multimedia, interactive exhibit for the Rochester Museum and Science Center. In the process of the preparation, the students help create and engage in a learning environment that embodies a community of practice resembling the natural world of work. Project Rochester differs in intent and activity from similar sounding projects that focus on "our community" but fail to involve learners in actual, real life work. In Project Rochester, the activities and outcomes are not contrived as "school activities", but are in fact the same as those that researchers and multimedia producers would have to conduct if

they carried out this project. This project creates a functioning learning environment by approximating the actual, not contrived, community of practice. As another example, chemistry students in Southwest High School in Fort Worth, Texas participated in a project that determined the most effective, economical and environmentally safe fertilizer for the lawns of schools in their district.

NASA. In Norfolk, Virginia, middle school students in an extended day program worked with NASA to design a tool that would be useful on a space shuttle. The students were given the opportunity to use the computer hardware and software that supported advanced mathematical calculations and presented their findings at a professional meeting.

COMMENTARY ON CONTEXTUAL LEARNING EXAMPLES

This section examines three issues: (a) the adequacy of the methodology used in the studies just described, (b) the coverage of the examples in terms of subject matter and populations and (c) the relationship of these examples to the ideal learning environment envisioned by Collins, Brown and Newman.[38]

Adequacy of study methodology

Five features of the evaluations are examined: sampling, study design, information about processes and practices, measures, and replications. Figure 2 summarizes the relevant features of the evaluations for Anchored Instruction, Functional Context Education and Reciprocal Teaching.

With respect to sampling, the studies utilized populations that range in age from kindergarten to young adulthood and include disadvantaged students. The studies utilized control groups, either formed by random assignment or by locating a matched control group. The Anchored Instruction studies typically randomly assigned students to treatment and control. The Reciprocal Teaching studies varied in the method of assignment, but typically had either an equated control group or adjusted for pre-test differences statistically in the analyses.

FCE used a pre-post gain score analysis, Anchored Instruction used a pre-post test comparison and the Reciprocal Teaching replicates used a variety of post test comparisons.

The next column, practices and processes, indicates what is being contrasted in the study. In other words, what are the differences between treatment and controls? In FCE, while the differences in the content and the structure of the materials are clear, it is not clear what differences there are in how instruction is delivered. Is the lesson given primarily in a lecture format or is there some opportunity for individual or group work? In Anchored Instruction, the processes and practices differed from study to study and are confounded with

Figure 2

Features of study design and evaluation

Study	Sample(s)	Study Design	Comparison	Measures	Replications
Functional Context Education (Sticht, 1992; Sticht and McDonald,1989; Sticht et al (1986).	Treatment group are recruits who scored below the sixth grade reading level cut-off score on three test occasions Ad hoc control groups constructed Size n=710 for treatment in FLIT	Gain score compared to gain score of those in general literacy program; groups were comparable at starting point	Treatment = FCE, emphasis on concrete then abstract and knowledge as needed to perform job task, Reading-to-do and reading-to-learn strand.	Specific tests developed to measure reading general literacy tests pre and post test given on graph, no exact means or standard deviations supplied. Metric is grade equivalent	FLIT JOBS JSEP XFSP
Anchored Instruction CTGV (1992,1992a, 1992b)	Matched control groups Random assignment small n in classroom studies evaluation Jasper n=739	Pre-post ANOVA, post test only (equated groups)	Treatment varies with the anchor, e.g. treatment=anchor+related materials control=same time/emphasis	Specific tests to measure problem formulation or comprehension Charts and figures to report differences in treatments	Replications of same experiment same site, different time, across years.
Reciprocal Teaching (Palincsar and Brown, 1984; Rosenshine and Meister, 1991)	Matched groups original study had 4 group design, 6 students each.	study lasted for 20 days, effects still persist after 6 months	Treatment = reciprocal teaching (comprehension building strategy teaching) Control = locating information and untreated control group	percent correct on comprehension questions related to passages read	19 replication studies found, average effect size is .52

the treatment. It is not always possible to tell what is actually being compared, that is what is the "it" of Anchored Instruction? The versatility of the tool means that it is used in a lot of different ways; what part of the effect is due to the videodisc and the novelty and what part is due to the content of the videodisc or the way in which it is used?

The actual measures used are presented in the fourth column. The measures used in the FCE are grade equivalents. The difficulty in interpretation and meaning of these measures outside (and inside, for that matter) their normal use for school aged children is acknowledged by Sticht et al.[39] Also, the manner in which the results are reported (on a chart without accompanying means and standard deviations) makes it impossible to know the magnitude of the effect. The replications of this approach indicate that the effect, of whatever magnitude it might be, is probably stable, but it is not clear how large the effect actually is. For example, it is difficult to interpret a gain score of 7 months in comparison to a gain score of 21 months when the unit month may measure different amounts of change at different points in the interval.

The Jasper evaluations often report results in graphs without any actual numbers attached and frequently report that results are significant without reporting the level of significance. Calculation of effect sizes are not always therefore possible.

Finally, he number and extent of replications are noted in Figure 2. For Functional Context Education, we note that although there are replications of the results across various military sites, there is limited evidence of replications in civilian situations. Sticht[40] reports that efforts were underway in the "de-greening" of JSEP for civilian use, however. The suitability of these methods for elementary or secondary students therefore remains to be demonstrated.

Finally he evaluation of Reciprocal Teaching and its replicates provides a good example of the need to look carefully at conditions of use when examining effects. All the replicates used Reciprocal Teaching, but some of them also varied the condition of use to incorporate explicit teaching. The effects were greater when explicit teaching was incorporated. Secondly, they document that in general results are greater when developer specific tests are used as the criteria for effectiveness.

On the whole, despite some methodological weaknesses, these studies provide empirical support for effectiveness of these approaches. The evidence on replication is most clear in Reciprocal Teaching, but while on average the results are positive, there are several instances with limited or no effects as well. The importance of replication by a party other than the developer is an important task for demonstrating the generalizability and transportability of the method. Anchored Instruction, because of its youth, has not focused on replications to the same extent as the other two.

Sample and Subject Coverage

Anchored Instruction appears to have been evaluated most often with upper elementary school students, with a variety of subject matters, including science, mathematics, and social studies. Several Jasper evaluations focused on high achieving students; the social studies and literacy also found consistent results for more disadvantaged children. However, we note that these children were not all that disadvantaged, at least in terms of achievement.

The different evaluations of Reciprocal Teaching have spanned a wide range of ages, from grade 3 through adult and have also been evaluated across a variety of ability ranges.

Functional Context Education has primarily been evaluated with males, in a narrow age range, who were significantly below expectations in reading performance.

The evaluations do not often provide information on the effect of contextual learning for very young children (before grade 3), or for secondary school students (grade eight and up). Many of the examples provided by Clinchy[40] also focus on this age range, with a particular emphasis in projects focused at the middle school.

The Relation of These Models to Cognitive Apprenticeship

Each of these three models starts with a similar framework, but with a different assessment of where the bottleneck is in learning. Sticht [41] underscores the importance of the breadth and depth of the knowledge base; CTGV plays up the problem of inert knowledge; Palincsar and Brown[42] place their bet on strategies. Thus, while these techniques come out of a common framework that emphasizes the social construction of knowledge they see the bottlenecks as arising for different reasons. For example, CTGV argues that children may have knowledge, but fail to activate it because they fail to see the connection to the problem at hand - the problem of inert knowledge. Inert knowledge is factual or other information that is learned but can not be accessed. The videodisc provides enriched experiences that will help them connect the thing learned to its use. The videodisc provides a way to experience contexts that would be difficult or impossible to construct.

For Sticht,[43] the bottleneck is that the recruits lack sufficient background knowledge (breadth and depth) to be able to comprehend the material they need to read in order to do their job. Given that there were only six weeks of training time, and that breadth and depth of knowledge take a long time to create, the remaining possibility was to reduce the knowledge requirements. Therefore, accommodation to the time constraint led to the controlling of the vocabulary to be that which was specific and functional to the job to be

learned. (It is important to note that some three quarters of the words were the same across the different job specific vocabularies, indicating that job specific skills actually have a large common, or general component.

Reciprocal Teaching, following the sociohistorical view of the construction of knowledge, sees the critical developmental purpose of the adult-child interaction in the classroom as the issue to be addressed. The problem in this case is that in traditional instruction students are unable to interact in a productive manner with adults.

The differences among these studies become clearer when each is mapped onto the ideal learning environment (ILE) of Collins, Brown and Newman.[9] Figure 3 maps these studies onto the cognitive apprenticeship framework.

In terms of the cognitive apprenticeship framework, FCE seems to pay most attention to domain knowledge and to the functional and situated aspects of knowing. That is, it focuses primarily on content, sequence and sociology (situated learning). Anchored Instruction, on the other hand, does not pay too much attention to content, while it does to method, sequence and situated learning. Reciprocal Teaching appears to pay most attention to method, but does attend to many aspects of the model.

This analysis suggests that only some portions of the ideal learning environment are covered by any one of these strategies. However, they are all covered to some extent when all three are considered. This suggests several possibilities for using these approaches as a basis for creating the ILE. First, each one of these models might be expanded to incorporate missing elements. For example, Functional Context Education could possibly incorporate cooperative learning teams or add to its repertoire of strategy training by borrowing some techniques from Reciprocal Teaching or other effective strategy teaching programs.[10] Similarly, Reciprocal Teaching might be enhanced by attention to the depth and breadth of domain knowledge. For example, Reciprocal Teaching could be a strategy effectively coupled with an integrated thematic curriculum. Anchored Instruction could readily be situated into different instructional models and provide a powerful technology and context in support of ILE. Second, an eclectic approach might be utilized, combining the simultaneous operation of distinct approaches. This requires a high level of understanding of the components of ILE, however and seems like a less practical approach.

DISCUSSION

This paper has argued that the restructuring movement in education today seeks to create a school that is fashioned, at least in part, after the new understandings about learning and thinking developed recently by cognitive science. The developments in this area challenge the central assumption of

Figure 3

Cognitive Apprenticeship and Contextual Learning

Study	Content	Method	Sequence	Sociology
Functional Context Education	Domain knowledge strategy (Read-to-do and Read-to-learn)		global before local	situated learning-learning connected to actual use
Anchored Instruction		embedded data design guided discovery,	global before local	situated learning-rich examples for actual use intrinsic motivation from engaging example
Reciprocal Teaching	Heuristics by example	model, support, fade scaffolding	global before local	culture expert practice, exploit cooperation intrinsic motivation

traditional schooling - the generalizability of cognitive skills. Instead of being abstract and general, this perspective argues that cognition is situated and constrained.

By implication, the practices of schooling that disassociate knowing from doing, thinking from acting, can not create ideal learning environments. From this perspective, the challenge of creating effective schools consists of creating ideal learning environments in which knowledge can be situated in use. Contextual learning attempts to create ideal learning environments by reconnecting authentic and legitimate uses for learning with situations in which learning takes place. It incorporates real world activities and purposes in order to reconnect knowledge to use.

The real world referent is significant because it legitimizes the importance of the activity. Activities that look like the real world, but serve no purpose in the real world do not have this legitimacy (remember the bowling score example of Herndon's). The visibility of connections with the real world is therefore probably a very powerful part of this contextualization. The visibility might come from displaying work at a legitimate and prestigious location, e.g. videos shown at the Science and Technology Museum in Project Rochester versus displaying school art work in school hallways or in the grocery store. The existence and visibility of a two way connection is important as well. For example, the California Partnerships which integrate vocational and academic instruction in an innovative manner also have a very visible connection of people from the outside world flowing through the school. The commitment of time and energy of "outside" people legitimates the importance of the pursuit of the students.

This legitimation of the activity may be crucial in situations in which motivation and valuing of the activity, for its own end, may be at issue. For example, in inner city schools, our observation is that the presence, time and commitment of clearly outside people (e.g. business men in suits) communicates a significant legitimation message. As an example, the evaluation of Writing to Read, an early literacy program from IBM, entailed periodic and regular visits of clearly-not-of-the-school-culture visitors. These visits appeared to legitimate and give social meaning to the activities in the program beyond the mere academic content of the exercises. Donations and books in the library do not convey the same type of legitimation in this setting.

This suggests that a central issue to understand in contextual learning is to what extent and how the real world connection serves to legitimize school activity. Resnick's contention is that schools are disconnected primarily because of the knowledge as general phenomenon issue, i.e. the disassociation of knowledge from its use. But, the disassociation between schools and the rest of the world is surely much broader and more complex than this cognitive view would suggest. Radical views might explain the disassociation as the lower status accorded institutions primarily run by women and involving

children, hardly the power brokers of American society. At any rate, even given the complexities of remaking the curricular connections along the lines of the methods reviewed here, these curricular/functional reconnections seem far simpler to address than the cultural and social ones.

American schools are seen as failing many children, and most certainly and critically they are seen as failing disadvantaged children. To what extent might contextual learning offer an avenue to alter the classic problems of disengagement of at-risk students? If the narrow sense of contextualization is meant and the ensuing focus is turned primarily to functional education, we needn't be too optimistic about the prospects for change. If the broader sense is entertained, in which school activities are legitimized because of meaningful connections to institutions and persons as well as functions outside of school, then, there seems to be more room for optimism.

How might the fledgling movement toward contextual learning be directed so that these larger goals of educating the society might be addressed?

(1) The many school programs that are attempting versions of contextual learning need to be encouraged by some visible national and state recognition. At the same time, efforts to apply more systematic evaluations and to disseminate results need to be encouraged. Perhaps such a step as establishing a special interest group through American Educational Research Association or other professional association could serve as a focal point for efforts that now are largely scattered. Because much of the research is generated in discipline specific areas (e.g. math or science), there is also a difficulty of accessing the relevant literatures.

(2) The research base on which many of the assumptions framing a view of situated cognition (and eventually contextual learning) is built needs to be expanded greatly. For example, a great deal of emphasis is given to studies of discontinuities in performance across settings. These ethnographic studies of performance make compelling reading, but still need replication and extension. Before dismantling the entire traditional structure of American schools, additional investigations incorporating larger samples and schools in the United States seem reasonable to ask for. Similarly, the whole issue of the generality or context specificity of skills, seems to be moving toward a synthesis that accommodates generality and specificity. The instructional implications of this line of work also needs greater attention.

ENDNOTES

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CHAPTER 3

INTEGRATING ACADEMIC AND VOCATIONAL EDUCATION: A REVIEW OF THE LITERATURE, 1987-1992

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INTRODUCTION

The 1990 Amendments to the Carl D. Perkins Vocational Education Act of 1984 require that "funds made available . . . shall be used to provide vocational education in programs that . . . integrate academic and vocational education in such programs through coherent sequences of courses so that students achieve both academic and occupational competencies."[1] In order for their schools to receive funds, state policymakers must submit plans that describe how they will provide a vocational program that integrates academic and vocational disciplines.[2]

While Congress' directive to spend Perkins funds on some form of integration is clear, the Amendments themselves provide little guidance on what integration means. The amendments stipulate one aspect of program design–that courses comprise "coherent" sequences and one program goal–that "students achieve both academic and occupational competencies," but they otherwise leave wide leeway for implementation. In particular, they do not stipulate that academic and vocational education be integrated in the same courses or course sequences. The regulations also provide no guidance about implementation, and the federal government has not provided technical assistance to states and communities to help them comply with the amendments. Finally, the Amendments redirect much of funding for vocational programs from states to localities. As a result, states have fewer resources to respond to local requests for technical assistance in implementing integrated programs.

The absence of specific guidance and technical assistance presents both pitfalls and opportunities. On one hand, research on implementation has shown that inadequate guidance can lead to both empty models of compliance and sincere, but incomplete efforts. On the other hand, the relative lack of direction opens the way for educators and policymakers to tailor integration approaches to local needs and conditions. To implement integration effectively, local policymakers and practitioners need to have the capacity to change, few barriers to change, and good information about the kinds of changes that have proven to be effective. In particular, policymakers and practitioners can be expected to explore a variety of integration models and

approaches in developing and implementing integration plans appropriate for their own schools and communities.

OBJECTIVES AND SCOPE

The 1990 Perkins Amendments authorized the National Assessment of Vocational Education (NAVE) to evaluate "the extent and success of integration of academic and vocational education." This literature review, conducted for the NAVE under the auspices of the National Center for Research in Vocational Education (NCRVE), is a first step toward evaluating the outcomes of integration. The review focuses on the following issues:

- What perceived educational problems has integration been proposed to address?
- What is the state of integration as it is practiced? What types of integration programs have been implemented or proposed? What norms and trends can be identified?
- What outcomes have been observed as a result of integration?
- How do the observed outcomes relate to the legislative goals of the Perkins amendments?
- Which policy factors appear to support integration? Which factors present barriers?
- What recommendations follow from any available firm research findings? In particular, which approaches look promising and which should be avoided?

The review is intended to be comprehensive from 1987 through mid-1992. We searched the following databases in September 1992 (most of which had been updated in August): ERIC, Social Science Citation Index, and Library of Congress and Education Index. We also include selected publications from the second half of 1992 as well as several NCRVE forthcoming studies to which we had access in draft form. We included all relevant published reports from the NCRVE. Overall we located and evaluated almost 100 pertinent articles, research reports, monographs, and books.

It must be stressed at the outset that much of the literature reviewed here does not report empirical studies; many pieces are theoretical, speculative, or advocative, while others are anecdotal. Moreover, some of the empirical studies that are available are flawed in ways which render their findings and conclusions suspect. Plihal et al.[3] had the same experience in their search of integration literature. The literature they reviewed did not describe program

specifics or program results. Despite these limitations, however, the literature does contain many studies that should be useful to policymakers and practitioners attempting to comply with the Perkins amendments and also to educational researchers attempting to describe and assess integration attempts.

Programs that integrate academic and vocational education can take several years to design and implement and several more before they graduate students. For this reason, most of the available research necessarily focuses on planning and implementation rather than outcomes. The Perkins Amendments call for the NAVE to assess the extent and success of integration; however, because the NAVE must present its findings to Congress by 1994, it will be able to provide only partial information on program success. The close timing of the legislation and the assessment works against finding the positive effects from integrated programs that Congress desired. Programs begun in response to the Perkins amendments are unlikely to show any substantive effects during the NAVE's charter.

THE INTEGRATION MANDATE

Vocational education reforms under the general banner of "integration" have been advocated by many groups: policymakers, educators, employers, scholars, and social critics. Each of these constituencies has its own perspective on what educational or social problems integration will help solve, and each has a somewhat different understanding of the kind of reform that integration requires of schools, whether curricular, pedagogical, or organizational.

Vocational educators and critics of vocational education alike view integration as a way both to improve the academic content of vocational courses and to help prepare students more broadly for employment where requirements are constantly changing. From this perspective, integration is viewed as a curricular reform that responds to changing and uncertain future skill demands.

Federal legislators view integration as a way to make the United States more competitive in the world economy by developing more fully the academic and occupational skills needed in a technologically advanced society. This view also treats integration as a curricular reform.

Employers have claimed that new job entrants lack basic skills or need different skills-problem solving, teamwork, communication-to succeed in the high-tech workplace of the future. For this group, integration would increase basic skills and modify the curriculum in ways to enhance "generic" workplace skills.[4, 5, 6, 7]

In the decade since *A Nation at Risk*, school reformers have echoed employers' concerns about basic skills and lack of "higher order thinking skills.[8] As a result, many school reformers seek to make academic learning more meaningful for all students and to prepare them more adequately for the world of work[9] (analysis of how school learning differs from out-of-school learning). For these reformers, integration focuses on improving student engagement and learning and on facilitating the transition from school to work.[10]

Educators view integration as a method to encourage academic and vocational teachers to share their respective teaching methods, which traditionally have differed.[11] In this instance integration is treated as a pedagogical reform that seeks to improve teaching and learning in both academic and vocational classrooms.

Others see integration as a way to increase social justice with respect to the distribution of academic and vocational learning.[12, 13, 14] For these critics of traditional education, integration means giving all students access to both academic and vocational educational opportunities. It is also a way of avoiding tracking, which many fear can create self-fulfilling prophecies.[15]

Clearly, the various supporters of integrating academic and vocational education all have different reasons for embracing it. As a result, integration is not a clear and unambiguous change, but a reform that comes in many guises.[16, 17]

These views about the potential benefits of integration for solving specific problems are largely hypotheses about expected outcomes; these have not been hypotheses adequately verified by evaluation of actual integrated programs. In many of the existing examples of evaluation, the evaluators relied on anecdotal evidence to demonstrate the benefits of integration.[18, 19, 20, 21]

Although we found little objection to integration in the literature, some teachers argue that basic skills are best taught in academic departments and that students can best prepare for vocational courses/programs by first mastering basic skills in an academic setting.[22] More generally, the accepted practice is to teach basic and academic skills before vocational or job skills.[23] Changes in teacher roles and (at least temporarily) workloads are among the observed outcomes of ongoing integration programs, and there is some evidence that teacher unions may present barriers to integration.[24] Integration outcomes and barriers will be explored in later sections of this review.

THE CURRENT STATUS OF PRACTICE

In response to the integration mandate "indeed even before the Perkins Amendments were enacted" states and localities began implementing programs

to integrate academic and vocational education. Most of the integration programs described in the literature are at secondary and postsecondary institutions.

Integration at the Secondary Level

Most of the literature we reviewed consists of descriptions of integrated programs and attempts to implement them. About 34 articles described secondary programs, and about 10 described postsecondary programs.

Descriptive research on models of integration reveals that approaches to integration vary considerably, ranging from marginal changes in existing courses to thorough reforms reshaping an entire high school. More complicated interventions may involve major curriculum changes, and require the effort and support of administrators and teachers of both academic and vocational classes.[25, 26, 27, 28, 29, 30, 31] Many examples exist of schools choosing to implement several different integration programs simultaneously.[32]

The purposes for adopting these models also vary substantially. At one extreme, some models are adopted to reform vocational programs, often by providing more remediation or academic enrichment for vocational students.[33, 34, 35, 36, 37] At the other extreme, some institute novel occupational programs that are highly disciplinary.[38]

While some states, districts, or schools have adopted ambitious reforms that effectively reconstruct the high school, most opt for fewer changes. By far, the most pervasive way to integrate programs involves the adoption of applied academics courses, either by investing in "off-the-shelf" curriculum materials (e.g., Principles of Technology, Applied Math, and Applied Communications)[39, 40, 41] or by developing programs locally.[42, 43, 44, 45, 46] NCRVE's Survey of Vocational Education in the Fifty States[47] indicates that 34 of the 45 states responding to a question about integrated curricula have invested in applied academics materials. Even so, implementing these curricula can involve a major effort on the part of teachers, particularly since many extensively revise these materials to meet their particular needs.[48, 49, 50, 51, 52]

Plihal et al.[53] analyzed secondary integration programs in two ways; they considered the subject matter of curriculum being integrated, and they studied the complexity of skills being taught in integrated courses. They separated the examples of integration into four vocational areas (agriculture, business, home economics, and industrial) and three academic areas (English, science, and mathematics). Many examples bridged more than one area, and some did not fit into the categories they defined. The greatest number of vocational

examples were in industrial education, while in academic education, math and science were most frequently integrated. Their analysis revealed that integration involved instruction in very basic skills; very few programs stressed higher order thinking skills.

In their efforts to design a new model for the comprehensive high school, Copa and Pease[54] explore a myriad of issues, including integration. They first discuss integration as a way to organize learners. They suggest breaking down large student populations into schools-within-a-school in order to facilitate a more personalized environment for students and instructors. They point out that when schools are organized around career paths, academic and vocational education become integrated as a result. They also consider integration in terms of organizing the learning process.

Another response to the integration mandate has been for schools to engage in the practice of assigning equivalent credit. Schools may grant academic credit for vocational classes without making any substantive changes to the curriculum.[55, 56, 57, 58] This response may occur, for example, when a site considers a vocational course already to have adequate academic content which students do not get credit for. In such cases integration becomes a way for students to obtain academic credits they may need.

The most comprehensive survey of integration reforms to date[59] identifies eight different models of integration, each of which has several variants and each of which serves many different goals.[60] Each varies in the extent to which the curriculum is modified, in changes to teachers or teaching, in students targeted for integrated programs, and in institutional changes required. Table 3.1 summarizes the eight models along these dimensions. We list the models briefly below:

1. Incorporating more academic content in vocational courses taught by vocational teachers to vocational students.

2. Combining academic and vocational teachers to incorporate academic content into vocational programs. Unlike model 1, this approach requires teachers to collaborate in curriculum development.

3. Making academic courses more vocationally relevant, by including more vocational content in academic courses or by adopting new courses such as "applied academics."

Table 3.1
Models of Integrating Vocational and Academic Education at the Secondary Level

	Curriculum Changes	Teacher Changes	Students Targeted	Institutional Changes
1. Incorporating more academic content in vocational courses	Vocational courses include more academic content	Vocational teachers modify courses	Vocational students	None
2. Combining vocational and academic teachers to enhance academic content in vocational programs	Vocational programs include more academic content, in either vocational courses or related applied courses	Academic teachers cooperate with vocational teachers	Vocational students	None
3. Making academic courses more vocationally relevant	Academic courses include more vocational content; sometimes new courses (e.g., applied academics) adopted	Academic teachers (usually) modify courses or adopt new ones	Potentially all students; in practice, vocational and general-track students	None
4. Curricular alignment: horizontal and vertical	Both vocational and academic courses modified and coordinated across courses and/or over time	Vocational and academic teachers cooperate; numbers range from two to all	Potentially all students; actual targets vary	None necessary; curriculum teams may foster cooperation
5. Senior projects	Seniors replace electives with a project; earlier courses may change in preparation	None necessary; teachers may develop new courses or modify content to better prepare students	All students	None necessary
6. The Academy Model	Alignment among academy courses (English, math, science, vocational) may take place	Vocational and academic teachers may collaborate on both curriculum and students	Usually potential dropouts; sometimes students interested in specific occupational areas	School-within-a-school; block rostering; smaller classes; links to employers
7. Occupational high schools and magnet schools	Alignment among all courses may take place, emphasizing the occupational focus	All vocational and academic teachers assigned to an occupational school or magnet within a school; collaboration facilitated	Students interested in specific occupational areas	Creation of a self-contained occupational school or magnet school
8. Occupational clusters, "career paths," and majors	Coherent sequences of courses created; alignment may take place among courses within clusters	Teachers belong to occupational clusters rather than (or in addition to) conventional departments; collaboration facilitated	All students	Creation of occupational clusters; enhancement of career counseling; possible cluster activities

Source: Grubb et al., 1991.

4. Curricular "alignment," by modifying or coordinating both academic and vocational courses across courses (horizontal alignment) or over time (vertical alignment).

5. Senior projects are done in lieu of elective courses and require students to complete a project that integrates knowledge and skills learned in both academic and vocational courses.

6. The Academy model is a school-within-a-school that aligns courses with each other and to an occupational focus. It is a program for selected students within a high school (See [61, 62] for further description and evaluation of the Academy model).

7. Occupational high schools and magnet schools align courses with each other and to an occupational focus for all students and programs in the entire school (also see [63] related discussion of "focus schools").

8. Occupational clusters, career paths, and occupational majors feature a coherent sequence of courses and alignment among courses within clusters. Teachers are often organized by clusters, not traditional departments.

Viewed nationwide, progress toward implementing integration programs remains spotty thus far. In general, efforts at integration have only recently begun, and many are idiosyncratic in the sense that they have been developed locally with little apparent influence from theoretical or empirical studies of integration reform. However, there are many centers of strong activity, including some large-scale efforts to develop programs and materials (e.g., Southern Regional Education Board, Ohio's Applied Academics, California Academies, and the CORD/AIT curricula) and ambitious plans (e.g., California's "Second to None" agenda).[64]

Integration at the Postsecondary Level

At the postsecondary level, much less is currently known about integration, partly because integration has been a much less urgent reform at this level. Examples of integration at the postsecondary level are much fewer, and the dominant efforts-the use of general education requirements and of applied academics courses-do not appear to be very substantial forms of integration.

At the postsecondary level, the rationale for and purposes of integration are less clear. At the secondary level, integration has been primarily a curriculum reform, justified by the need to better prepare students for work or postsecondary training and education opportunities.[65] This argument contains some validity at the postsecondary level as well. Integration might also join together parts of the community college that have been separated. Overall, the desirability and purposes of integration have not been widely or

deeply examined by the postsecondary education community. Much of the literature describes integrated programs from around the country but does not assess their value.[66, 67, 68, 69, 70] At this point, integration seems to be chiefly a secondary reform, though by legislative action it also applies to postsecondary education.

Results from an NCRVE survey of about 300 community colleges[71] indicate that postsecondary institutions have implemented a variety of integration models, as follows (see also [72, 73]):

1. **General education requirements.** Many schools require occupational students to enroll in general education courses. While most schools do not modify these classes to suit vocational students' needs, many at least offer guidance as vocational students choose their courses.

2. **Applied academic courses.** These are academic courses that utilize applications in occupational areas and are primarily designed for occupational students. Examples include technical writing, business math, and agricultural economics.

3. **Cross-curricular programs.** These types of programs offer a way for more academic content to be included in occupational programs, by emphasizing both the academic and vocational content. The most common form is Writing Across the Curriculum, but other versions include Communications Across the Curriculum, Humanities Across the Technologies, and Reading Across the Curriculum.

4. **Incorporating academic modules in occupational courses.** At the classroom level, some occupational instructors incorporate academic modules in their occupational curriculum. Instructors might include academic disciplines such as history or ethics in their courses.

5. **Multi-disciplinary courses combining academic perspectives and occupational concerns.** In most cases these courses are designed by academic and occupational faculty working together. Some of the more common themes are the role of work for individuals and society, the history of technology and its effects on society, and ethical issues surrounding work and technological change.

6. **Tandem and cluster courses and learning communities.** Such groupings provide a structure for integration since students take complementary courses-both academic and vocational-concurrently. In this model, teachers may reinforce material taught in the related courses, analyze similar issues from various perspectives, utilize common examples and

applications, design projects for more than one course, or build on concepts taught in the other courses.

7. **Colleges-within-colleges.** These can best be described as expanded clusters. Colleges-within-colleges are rare since most students are either unable or unwilling to commit to an entirely pre-set program.

8. **Remediation and ESL programs with an occupational focus.** These types of programs were developed to address the needs of vocational students requiring academic remediation and ESL instruction. They focus on relatively basic skills, but include introductory material in an occupational area. Like applied courses, they provide an occupational context for vocational students.

As Table 3.1 does for secondary models of integration, Table 3.2 summarizes the features of the eight postsecondary models along four key dimensions.

Comparison of Secondary and Postsecondary Integration Models

Several of the postsecondary models resemble models of integration common at the secondary level. One chief difference between the two sets of models is that fewer of the postsecondary models involve changes within the classroom, which is what we see happening in high schools. Another important difference is that few postsecondary models involve restructuring.

The most direct comparison can be made between Postsecondary Model 2 (Applied Academic courses) and Secondary Model 3 (Making academic courses more vocationally relevant). These two involve the same types of changes taking place, namely, academic work being taught through vocational applications. Postsecondary Model 8 (Remediation and ESL programs with an occupational focus) is designed along these same lines as well, but concentrates on more basic skills.

Postsecondary Model 6 (tandem and cluster courses and learning communities) most closely resembles Secondary Model 8 (occupational clusters, career paths, and occupational majors). Under both models, students enroll in complementary academic and vocational courses as part of the same program and instructors develop and build on similar material. Secondary Model 5 (senior projects) also enables students to integrate skills and material being taught in various courses concurrently.

Postsecondary Model 5 (multi-disciplinary courses combining academic perspectives and occupational concerns) and Secondary Model 4 (curricular "alignment," modifying both academic and vocational education) correspond in several respects, since the two entail modification of both academic and vocational courses.

Table 3.2
Models of Integrating Vocational and Academic Education at the Postsecondary Level

	Curriculum Changes	Teacher Changes	Students Targeted	Institutional Changes
1. General education requirements	None	None	Vocational students	None
2. Applied academic courses	Academic courses include more vocational content; sometimes new courses adopted	Academic teachers modify courses	Vocational students	None
3. Cross-curricular programs	Occupational programs include more academic content	Potentially all instructors modify courses	Vocational students	None
4. Incorporating academic modules in occupational courses	Occupational courses include more academic content	Occupational teachers modify courses	Vocational students	None
5. Multi-disciplinary courses combining academic perspectives and occupational concerns	Both vocational and academic courses modified	Academic and occupational teachers work together	Potentially all students	None
6. Tandem and cluster courses and learning communities	Both vocational and academic courses modified and coordinated across courses and/or over time	Academic and occupational teachers work together	Vocational students	Creation of clusters
7. Colleges within colleges	Both vocational and academic courses modified and coordinated across courses and/or over time	Academic and occupational teachers work together	Vocational students	Creation of college-within-a-college
8. Remediation and ESL programs with an occupational focus	Basic academic courses include more vocational content	Academic teachers modify courses	Vocational students	None

Postsecondary Model 7 (colleges-within-colleges) is most like Secondary Model 6 (the academy model). In both models, students attend occupation-oriented, self-contained programs. Secondary Model 7 (occupational high schools and magnet schools) also involves students enrolling in occupation-oriented courses.

Postsecondary Model 4 (incorporating academic modules in occupational courses) and Secondary Model 1 (incorporating more academic content in vocational courses), involve vocational teachers adding academic content into their vocational courses. At the postsecondary level, individual teachers take the initiative and teach short modules on academic education within a

particular occupational course, while at the secondary level instructors stress academic skills throughout the vocational curriculum.

Along these same lines, both Postsecondary Model 3 (cross-curricular programs) and Postsecondary Model 1 (general education requirements) also increase exposure to academic skills; the first by teaching academic skills in an occupational setting; the second by teaching academics in a setting outside the vocational classroom.

OBSERVED OUTCOMES OF INTEGRATION

Many positive and a few negative outcomes have been observed to accompany integration programs. To date, desired student outcomes-such as improved learning, engagement, and school transition-have been reported but not substantiated. Thus, most observations assume that integration will ultimately be shown to produce desired outcomes-i..e., to demonstrate that integration is a good idea.

Positive Outcomes

The literature notes the following types of positive changes associated with implementation of integrated programs:

1. Integration of content from traditional academic courses with vocational content, by modification of academic or vocational courses alone, or by curriculum alignment.[74, 75, 76]

2. Increased collaboration between academic and vocational teachers, in the form of joint curriculum development, joint planning across separate courses, or team teaching.[77, 78, 79, 80, 81]

3. A shift away from teaching specific facts and procedures to teaching generic skills, including complex reasoning abilities and widely useful attitudes and work habits.[82, 83]

4. Modification of teaching methods to draw on strengths generally associated with academic or vocational instruction.[84] On the vocational side, this includes project-oriented methods, more student-initiated activities, group work, teaching of abstract or general principles in the context of specific applications, and an emphasis on tutoring or apprenticeship methods rather than lecturing.[85, 86, 87, 88] From the academic side, we see greater emphasis on writing, use of focused discussion, and the "whole language" principle of exploring several representations of a single idea (e.g., projects incorporate written, oral, and physical components).[89]

5. Integration of vocational and academic students, primarily in magnet schools, the Academy model, or schools with an occupational/career focus.[90, 91]

6. Changes in organizational structure to facilitate other forms of integration, such as the Academy established as a school-within-a-school.[92, 93]

7. Improved guidance and counseling functions.[94, 95, 96]

8. Improved student achievement[97] (discussed further below)[98, 99]

9. More students go on to postsecondary education.[100, 101]

10. Greater self-esteem for vocational students when they feel they are being treated as equals to academic students.[102]

11. Increased school participation (attendance, course taking) and reduced dropouts.[103, 104, 105]

Table 3.3 summarizes the goals, models, and observed positive outcomes of integration that have been reported in the current literature.

Negative Outcomes

Most of the negative outcomes of integration have been reported in one domain, namely, changes to teachers' responsibilities. In sites implementing different forms of integration, from applied academics to more ambitious models, both academic and vocational teachers can experience significant changes in roles. These include new teaching responsibilities (e.g., vocational teachers teach "employability", academic teachers teach more "applied" courses); new procedures for developing curricula; different students to teach; new subject areas to master.[106, 107, 108, 109, 110, 111] Plihal et al.[112] hypothesize several positive outcomes of integration related to teachers, including additional intellectual stimulation, greater prestige, improved relationships with colleagues, and increased opportunities to see students learn. Nevertheless, the research to date suggests that severe alterations in teachers' roles can affect morale and take considerable time for adjustment. Outcomes considered negative by at least some teachers include the following (from [113, 114, 115]):

1. Teachers must work with groups of students from different skill levels.

2. Teachers must incorporate two major content responsibilities into their teaching schedule.

Table 3.3
Integration Goals, Models, And Observed Positive Outcomes Reported In Research To Date

Goals	Models	Observed Positive Outcomes
1. Improve academic content of vocational courses. 2. Better prepare students for employment. 3. Make U.S. workers competitive. 4. Improve basic workplace skills. 5. Increase student engagement. 6. Utilize activity-based pedagogy. 7. Increase access to both academic and vocational education. 8. Encourage teachers to collaborate.	Secondary 1. Incorporate more academic content in vocational courses. 2. Combine academic and vocational teachers to incorporate academic content into vocational programs. 3. Make academic courses more vocationally relevant. 4. Modify both academic and vocational education, curricular "alignment". 5. Senior projects. 6. Academy model. 7. Occupational high schools and magnet schools. 8. Occupational clusters, career paths, and occupational majors. Postsecondary 1. General education requirements. 2. Applied academic courses. 3. Expanded vocational courses. 4. Cross-curriculum efforts. 5. Tandem courses. 6. Cross-disciplinary and hybrid courses. 7. Vocationally-oriented remedial programs. 8. Colleges-within-colleges.	1. Integration of academic and vocational content. 2. Increased collaboration between academic and vocational teachers. 3. Increased teaching of generic skills. 4. Improved pedagogy. 5. Less separation of vocational and academic students. 6. Changes in organizational structure to facilitate integration. 7. Improved guidance and counseling functions. 8. Claims of improved student achievement. 9. More students go on to postsecondary education. 10. Greater self-esteem for vocational students. 11. Increased school participation and reduced dropouts.

3. Teachers need additional basic skills and diagnostic training.

4. Teachers are forced to deal with low achievers.

5. Teachers may dislike the added responsibilities if they are not compensated for the additional class and prep time.

6. Teachers need more planning time.

Some of these outcomes may be temporary in the sense that they are associated with the implementation process (for example, 3 and perhaps 5);. others may be lasting effects of integration. Although these outcomes may be viewed negatively by teachers, from other perspectives they may be considered acceptable or even desirable.

Other reported negative outcomes include a complaint that when academic material is incorporated into vocational courses, it is at such a low level as to be considered remediation.[116, 117, 118]

EVALUATIONS OF INTEGRATION PROGRAMS

What are the strengths and weaknesses of integrated programs with respect to broader legislative goals, such as improving vocational education to increase economic competitiveness, increasing skill levels and academic performance of vocational students, and increasing equal access for special populations? At this point our ability to link the outcomes of integration with these goals is limited and tentative at best. One reason for this is methodological; many questions remain to be addressed regarding the appropriate measures and standards for assessing programs, including the difficult question of how to reconcile local needs with the capability to make meaningful comparisons across programs and states.[119]

The second reason, as we indicated in our opening remarks, relates to timing. Although Congress would like to have evaluations by 1994, it will be too early at that time to conduct evaluations of most integration programs since they will be in only their first or second year of implementation. Integration is a new reform under the amended Perkins, and its potential has not been fully realized.

In the few cases where integrated programs have been established long enough to expect changes in learning or access, we generally lack sufficient data to evaluate such effects. Furthermore, we uncovered no research studies that link integrated program participation to economic competitiveness or that even begin to indicate how this might be done. And, while the literature revealed several instances of programs targeted to special needs students, no studies addressed the effects of integration on access to vocational education for these students.[120, 121]

This section discusses and critiques research from the integration literature that attempts to measure increases in student knowledge and skills as a result of integrated programs. The few evaluation studies we identified provide little hard evidence that participation in an integrated program affects student learning. Nearly every study had serious methodological or conceptual flaws that cast doubt on reported findings. We briefly discuss them below (see

Table 3.4). A few other studies appeared to apply to integrated programs, but we were unable to specifically determine this from the curriculum descriptions provided.[122, 123] Other studies focus on integration, but do not provide enough information about study design, data collection, or sample sizes to adequately evaluate the reported findings.[124] Finally, the evaluations we reviewed pertain only to secondary programs; evaluation of educational reforms at the postsecondary level (specifically, the community colleges) is notoriously rare.

Applied Academic Evaluations

In 1989, Pepple and his colleagues began a study for the National Center for Research in Vocational Education (NCRVE) of the Applied Communications (developed by the Agency for Instructional Technology) and Applied Mathematics (developed by the Center for Occupational Research and Development) curricula. The study aimed to identify and assess the gains in basic skills which resulted from implementation of these curricula in several pilot sites. Pepple reports partial findings from an evaluation of Applied Mathematics and Applied Communication curriculum at several demonstration sites in Indiana. The study compared pre- and post-tests on a 63-item normed, multiple-choice test developed by the State of Illinois. Items were matched with seven state goals in mathematics, and mean change scores were reported on items associated with each goal for control groups (students in regular math course) and experimental groups (students in applied mathematics course). Based on differences in total change score for the experimental versus control groups (7.06 and 3.02, respectively), the authors conclude that "the Applied Mathematics curriculum materials enable students to perform at higher academic levels across a broader range of skill areas in mathematics than the traditional materials being used in comparison classes."[125]

The report does not adequately discuss how experimental and control groups were "matched," nor does it present any information with respect to student background, specific math instruction, grade level, etc., that might identify other factors that contribute to the results. In addition, the data that are presented have several problems. For example, different numbers of students took pre- and post-tests, so results can be biased depending on which students remained in the sample at post-test. Change scores are aggregated over an unknown number of classes, which assumes that math instruction (the treatment) was uniform across all. In short, the data presented do not unequivocally support the conclusion.

The data reported for the Applied Communications evaluation show pre- to post-test gains on criterion referenced tests for 8 curriculum modules. Since there is no comparison group, we cannot determine if gains are attributable to the Applied Communications curriculum. The assessment covers 8 of 15 modules, thus we have no data at all on nearly half of the curriculum.

Table 3.4
Evaluations of Integrated Programs

Study	Sample	Curriculum	Design	Findings	Limitations
Pepple (1991)	From 280 to 174 applied math students; 158 to 95 regular math students Varies from 63 to 160, by module	Applied math Applied communication	Pre-post on normed test Comparison groups: applied math/regular math Pre-post test on 8 of 15 modules	• Total change score higher for applied math students than regular math students. • Pre-post test gains on criterion referenced tests for 8 curriculum modules.	• Student matching not specified. • Unexplained reduction in sample from pre- to post-test. • No comparison group. • Only 1/2 module tested.
Pepple and Law (1991)	25 teachers	Applied academics	Survey of several process variables	• Teachers note positive changes in student attitudes.	• Sample of teachers selected, not representative • Small sample
CORD Field Test (CORD, 1989)	About 800 students Ranges from 794 (mod A, B, C) to 63 (mod 13, 14, 15) students 38 - 3 teachers	Applied math, units A through 15 Units A through 15 Units A through 15	Pre-post only, 20-item test validated by panel of educators Surveys of teacher and student perceptions	• Distribution of pre-test to post-test scores indicates improvement from pre- to post-. • Generally positive evaluation of curriculum; for each unit only 2/3 reported "liking" the unit.	• No control/ comparison tests. • No statistical tests (means or standard deviations). • Initial sample of 40 sites for first group of units (A, B, C) reduced to 5 sites for final group of units (13, 14, 15). No accommodation is made for loss of sample. • Data presented for students completing at least 17 of 20 questions. Not clear how many in this group or why this criterion (17 of 20) was used. • Survey data averaged over 6 units, with differing numbers of respondents in each. Averages not weighted.

Table 3.4--Continued

Study	Sample	Curriculum	Design	Findings	Limitations
CORD/ Green County (CORD, 1989)	Number of students not reported.	Applied math (experimental) General math (comparison) Algebra I (comparison) Applied math (units A-22)	Comparison group Pre-post C.A.T. Posttest only C.A.T. Posttest only C.A.T.	• C.A.T. scores increase more for applied group than for general math. • C.A.T. mean scale scores for both classes equivalent.	• No statistical tests, no means, sds reported. • Comparison group and experimental differ at pre-test by perhaps as much as 10 percent, but data not provided. • 1990 applied math 1 scores show increase pre to post, but no comparison group, thus no controls for knowledge at pre-test.
CORD/ Lake Gibson (CORD, 1989)	62 students taught by CORD trained teacher; 26 taught by "other" teacher	Applied math I and II	Postcourse only survey	• Generally positive responses to very general yes/no questions. 80 percent of students with trained teacher rated AM "better" than previous math course; 50 percent with other teacher rated AM "better."	• No statistical test between groups; generally high ratings on "generic" questions. • Question of whether applied class "better" than previous class does not control for previous class enrollment.
CORD/ Clark County (CORD, 1989)	Students (N=64) and teachers of applied/ technical math (Clark County School District)	Applied math	Postcourse survey	• Generally favorable ratings by students No instructors could cover all A/TM units in a year.	• Small sample. • No statistical analysis.

Table 3.4—Continued

Study	Sample	Curriculum	Design	Findings	Limitations
CORD/ New Castle County (Stearrett, 1991)	N=405 grade 11 students enrolled in district	Principles of technology	Post-test only on science battery of Stanford Achievement Test Comparison groups: students in POT, chemistry, biology	• Students elected to enroll in PT (N=87) have significantly higher scores on a science subtest of the Stanford Achievement Test than those who do not (N=318); no difference between their scores on the complete test battery.	• Statistical tests not reported. • Non-random assignment. • Data aggregated across schools and classes.
Crain et al. (1992)	"Lottery" winners and losers; 3272 "average" readers in 44 programs; 986 below-average readers in 47 programs	Total career magnets and "academy" magnets with various occupational foci	Randomized experiment	• Career magnets: - encourage students to stay in school. - raise reading scores. - provide opportunities for more students to pass the advanced math tests. - gave students more credits toward graduation. • Students with poor reading scores had high rates of absenteeism.	• Analysis completed for a cohort of 9th grade students only. • Does not determine why specific program features contribute to reported gains.
Heebner et al. (1992)	70 students, 62 teachers, counselors, and administrators	Four magnet schools: business, communications, cosmetology, criminal justice	Structured interviews Students selected from pool of randomly assigned lottery winners and losers	• Students in career magnets develop: - an optimistic future. - multiple strategies for mixing careers and education. - values and social skills associated with work. - more positive attitudes toward school. • Faculty morale is higher at career magnets. • Both school types lack adequate career guidance. • Total career magnets fail to serve students with poor academic records.	• Small sample.

Table 3.4–Continued

Study	Sample	Curriculum	Design	Findings	Limitations
Heebner	Lottery winners and losers	Three magnet schools: criminal justice/law, communication, business	Randomized experiment	• Career magnet students: - have significantly higher math scores at end of 10th grade. - have lower dropout rates. - accumulate fewer credits toward graduation. - miss more days of school.	• Small sample, especially for high- and low-level reading groups.
Dayton, Weisberg, and Stern (1989)	Varies; academy cohorts range from 9 to 72; comparison cohorts slightly larger	Nine California Peninsula Academies programs	Academy students compared with matched non-academy students in same school Multiple regression controlling for previous performance, gender, race/ethnicity, birth date	• Scores in reading and math (for academy students only from 1987 to 1988) show no clear pattern. • Academy programs have fairly consistent significant, positive effects on attendance, credits, grade point averages, and courses failed as compared to non-academy students. • Strongest effects appear in year one, then decline. • Effects uneven across sites. • Substantial success in reducing dropouts.	• Very small sample sizes in some academy cohorts. • Uneven number of cohorts over sites.

Desired criterion levels are not presented, so we are unable to judge if students' post-test performance (ranging from 69 to 82 percent on the various modules) meet acceptable performance standards. The conclusion that "the Applied Communications curriculum materials enable students to perform at higher academic levels across a broad range of skill areas in language arts" appears unwarranted.

Pepple and Law[126] report some preliminary qualitative survey data from 25 teachers who attended an Applied Academics workshop in December 1989. Survey questions focus on process variables (e.g., how teachers selected materials to use; perceived advantages and disadvantages of applied materials versus traditional curricula), not on student outcomes. As Pepple notes, the sample of teachers is not representative and most were chosen to participate at pilot sites on a competitive basis.

CORD Studies

In response to our request for evaluation studies of their curricula, The Center for Occupational Research and Development (CORD) sent results from five studies of two of their curriculum packages: Applied Mathematics[127] and Principles of Technology.[128] Study 1 was a field test of Units A through 15, conducted by CORD. The other studies were conducted by schools or districts. Three provide test data; three report on surveys of students and teachers. Only one (Study 5) provides adequate evidence that students enrolled in these classes increased math or science knowledge. We briefly discuss the findings and major limitations of each.

The CORD study of applied math uses a pre-/post-test design with no comparison group. Distribution of pre- and post-test scores on a 20-item test validated by a panel of educators indicates improvement from pre- to post-test for applied math students who completed at least 17 out of 20 items. The study summary does not present means, standard deviations, or statistical tests of any kind. No explanation is given for the loss in sample size, or the characteristics of the sample completing 17 of 20 items. Reported survey data responses were averaged over six different units, with differing numbers of respondents in each. Weighted averages or statistical tests are not reported.

A second study, conducted by Green County Schools (North Carolina), uses a pre/post-test design to compare the California Achievement Test (CAT) scores for students enrolled in Applied Mathematics or general math. A second analysis indicates pre- to post-test gains for another group of Applied Math students, but with no comparison group or statistics reported. A third analysis employed a post-test only design to compare students in Algebra I with students in Applied Mathematics (units A-22). In the first comparison, CAT scores for the Applied Mathematics students appear to increase more than those for the general math students. Means, standard deviations, and statistical tests are not reported. The second comparison indicates equivalent mean scale scores for both Applied Mathematics and Algebra I students at post-test. Statistics are not reported. Since student knowledge at pre-test is not controlled, pre-test differences could account for the reported results.

Studies 3 and 4 report responses to surveys about the Applied Mathematics curriculum to a small sample of students and teachers in Florida (N = 88 students) and Nevada (N = 64 students, unspecified number of teachers). Results indicate generally positive responses to very general questions (e.g., this material helped you in other courses; this material was difficult to understand). Neither the full range of responses nor statistical tests were reported. Teacher responses indicate some problems; for example, none of the teachers in the Nevada sample could cover all of the Applied Mathematics modules in a year.

New York City Career Magnet Evaluation

The most convincing research demonstrating outcome improvements for students enrolled in integrated programs is reported in Crain, R.A., Heebner, & Si, Y.P. (1992).[129] Crain and his colleagues studied 133 career magnet programs serving one-third of public school students in New York City. Since half of the students admitted to the program are assigned by a "lottery" system, the evaluation is based on a rigorous randomized experimental design. For lottery "winners" and "losers" (students desiring to attend a program but who were not selected) Crain assessed several outcomes, including school dropout rates, absenteeism, improvements in reading and math, and rates of progress toward graduation. He found that students whose academic records would not normally be strong enough to gain admission to a selective magnet school benefited in several ways: they were less likely to drop out of high school in the transition between middle school and high school; they showed a gain in reading scores, and they earned more credits for graduation (last two effects hold for readers with average reading performance only). A comparison of whole school versus school-within-a-school (Academy) programs indicated some differences between programs: The former type was more successful in encouraging middle school students (especially those with low reading scores) to enroll in high school; the latter type was more effective in raising reading scores. Although these results are encouraging, the analysis has only been completed for a cohort of ninth grade students. This research is ongoing, and further analyses of tenth and eleventh grade students will be forthcoming.

A companion report [130] used ethnographic methods to study career magnet programs as a means to determine why the outcomes discussed above are obtained. Researchers interviewed 70 students and 62 teachers and administrators in career magnets and comprehensive high schools and found that students in career magnets developed more confidence in their ability to enter the job market and more varied plans for the future than comprehensive high school students. They also have more positive attitudes toward school and develop work-related values and social skills. Teachers at career magnets have higher morale than their counterparts in comprehensive high schools. Negative effects were also noted: adequate career guidance is lacking in both schools; career magnets serve average students better than those with poor academic records.

Academy Evaluations

Stern,[131] in his summary of programs combining school and work, reviews evaluation of academy programs in Philadelphia and California which have been established for some time (respectively since 1969 and 1981). According to Stern's review, "relatively rigorous evaluations of academy programs have produced reliable evidence of effects on high school completion and

performance after graduation" (p. 26). Reller (1984, p. 76; and 1985, p. 31)[132, 133] reported lower one-year dropout rates for students in two California Peninsula Academies than comparable students at the same high schools. Dayton, Weisberg, and Stern[134] found lower cumulative, multi-year dropout rates for academy students than for students in matched comparison groups (see Table 3.4).

Dayton, Weisberg, and Stern[135] report findings from nine California Peninsula Academies, comparing academy students with matched, non-academy students in the same school. Scores on reading and math tests (for academy students only) show no clear pattern; some increase (from 1987-1988), some decrease. Academy programs generally improve student attendance, credits taken, and grade point averages, and decrease number of courses failed and instances of dropping out. These effects are uneven across sites, however. Strongest effects appear in year one, decline by year two, then disappear by year three. We note several problems with the data, including small sample sizes and uneven numbers of cohorts due to different "start" times at the sites.

Follow-up surveys of graduates of the two original Peninsula Academies and students from the same two high schools showed no significant differences after 27 months between the groups in employment status, wages, or hours worked.[136] Academy students had significantly higher educational objectives than comparison students (55 percent vs. 24 percent, respectively); they expected to complete a four-year degree or more. Follow-up surveys in California replication sites [137] show similar patterns of employment and schooling. The only significant difference was in hours worked; employed academy students (also attending school or not) reported working about three more hours per week than comparison graduates.

IMPLEMENTATION BARRIERS AND SUPPORTS

An overarching conclusion of empirical work on policy implementation is that it is incredibly hard to make something happen, particularly across layers of government and institutions. This is true not only because social problems tend to be thorny, but because policymakers cannot mandate the two key factors for policy success: local capacity and local will. Policies can address capacity by, for example, providing training, money, or consultant expertise. Will–the motivation, beliefs, and attitudes that underlie the implementor's response to a policy or goal–is less amenable to intervention (see [138], for further discussion). Moreover, schools are complex organizations with long histories of established practice. Integration reforms entail changes to many deeply rooted practices. Consistent with this view of policy implementation, research on integration has identified many potential barriers and supports to successful implementation of integrated programs, some of which are

amenable to policy intervention and some of which are not. We briefly summarize these below.

Legislative mandates cannot necessarily create the elements that promote innovation in schools–local vision, leadership, sustained support, financial and other resources. School systems may lack the capacity to respond to the integration mandate. Integration is essentially a curricular and pedagogical reform that requires a bottom-up solution. In addition, these changes often require or encourage changes in school organization.

Schools often undertake such changes in an atmosphere where other local or state policies–such as graduation requirements, teacher certification–may conflict with their goals for integration. In some states, state policy favoring job-specific skill training may collide with the intention in the Amendments to stimulate a broader reform of vocational education designed to prepare youth for a technologically advanced, globally competitive workplace.

Local Leadership

Administrative support has proven to be a necessary precondition for success.[139, 140, 141, 142] This finding is common to most implementation research. Administrators who encourage risk taking, yet recognize that failure is possible, help create an effective environment conducive to innovation.[143] However, administrative focus on integration as a mandate per se can hinder the process. Schools that approach integration as something that has to be done because it is dictated by a higher authority create a hostile environment that may provoke teacher resistance. If the integrated program will result in job loss or major role changes for teachers, resistance may be enhanced and may threaten necessary collaboration between teachers.[144]

Past experience demonstrates that a shared vision and a long-term planning horizon can support implementation. Schools with a shared vision for integration that focused on improving the school's ability to serve students [145, 146] and that incorporated changes within a long-term plan made a smoother transition. A longer planning horizon permitted a clearer understanding of when changes would take place and gave teachers time to adjust to changes or seek other options, such as retirement or recertification.[147, 148] Effective planning can also permit contacts with relevant outside groups, particularly the business community.[149]

Resources

Schools differ in their capacity to respond to the integration mandate since a myriad of background factors can affect the ability of schools to implement integration. Those with a strong financial base, past history of innovation, a stable, unproblematic administration, and economies of scale that allow

flexibility (e.g., more students to distribute over the master schedule or more teachers to absorb new classes), for example, can make a smoother transition than those who do not have these characteristics.[150]

When seed money runs out, programs need local support to survive. To implement integration and other mandated programs, Perkins funds must be supplemented by state and local monies. When programs compete for scarce resources, their survival may depend on local leadership and vision, staff commitment, and general capacity to sustain the innovation. In a state that provides seed money to innovate, for example, research found one site that is succeeding (despite a bankrupt district) because of strong leadership and a vision of integration that involves changes in the entire school program. At another site, an Academy is in jeopardy because the school administration and counselors do not recognize the need for the program.[151] Similarly, successful Academy programs have strong district and public sector support for additional resources needed for these programs (e.g., more teaching time, special administration).[152]

Support of Teachers

Integration can require significant changes in teachers' roles. Teacher unions can influence program design with respect to permissible changes in teacher roles and responsibilities.[153]

Perceived and actual differences between vocational and academic teachers impede reform. Vocational teachers are perceived as lacking the skills necessary to adequately incorporate related academic subjects (e.g., math, science, English) into their courses.[154, 155, 156, 157, 158, 159] This perception influences the design of integrated programs at the local level. Academic and vocational teachers are trained differently and have different teaching credentials.[160, 161, 162, 163, 164]

Adequate staff and curriculum development are essential for integration, since teacher preparation institutions do not prepare teachers for integration of academic and vocational education, and since adequate curricula are not available. This can include inservice courses or opportunity for teachers to collaborate on curriculum and classroom instruction. Most schools do not provide adequate staff development for integration.[165, 166, 167, 168, 169, 170, 171]

Finch et al.[172] studied methods being used at schools to help teachers adjust to integration. One of the most common approaches was team building, which involved having several teachers from different subject areas working together. Another common form of professional development was teachers teaching other teachers, both on their own time and during organized sessions.

Other tools available to administrators to help teachers during the implementation of integration include scheduling, committee assignments, adequate teacher preparation in specific subject areas, communication links, and the use of counselors to provide insight and support. The study recommends that administrators be inclusive, empower teachers, and facilitate–but not force–integration.

Schmidt et al.[173] provide an overview of integration from the perspective of teachers. The authors assess teachers' roles in implementing integration along six dimensions; cooperative efforts, curriculum strategies, instructional strategies, administrative practices and procedures, student outcomes, and teacher outcomes. Within each they specify practices that teachers and administrators can utilize to implement and maintain integration.

Positive inducements for teachers to change can help the process. Administrators can offer many types of inducements for change, including: tuition reimbursements for vocational teachers seeking to upgrade their credentials; funds for curriculum development; time for joint planning among vocational and academic teachers and administrators; reduced teaching loads during the adjustment period; and means to document new curriculum for widespread sharing.[174, 175, 176] The absence of these measures may work as negative inducements to change, resulting from overburdening teachers with new curriculum preparations every year [177, 178, 179] and practices that keep vocational teachers' work "at the margins," particularly in comprehensive high schools.[180]

Organizational and Policy Barriers

The existing separateness of vocational and academic education at all levels presents a major stumbling block to integration. This separateness is seen in curriculum offerings, teacher preparation and credentialling, students served, etc., and effectively creates two cultures of schooling.[181, 182, 183, 184, 185, 186, 187, 188, 189] Legislation and education reforms-both historically and at present-tend to preserve this separation.[190, 191] Current federal legislation, for example, defines vocational education as preparation for work that requires less than a baccalaureate degree. As Benson points out, "this definition is inappropriate if the objective of federal policy is to integrate substantive content from theoretical academic fields with content from fields of occupational development."[192]

Separation is often manifested in actual physical separateness of vocational and academic classrooms, an arrangement that Copa and Pease warn against in their model for a new comprehensive high school. In some states, like Ohio, most vocational high school students attend separate schools. Moreover, this separation is fueled and justified by vocational education's negative image. Vocational education has long been viewed as an academic "dumping ground"

for intellectually inferior students or as job preparation for poor or immigrant youth.[193, 194]

State and local policies can work against implementation of integrated programs or can shape program goals in ways that do not necessarily enhance integration per se. Graduation requirements, for example, can drive the need to obtain academic credit for applied academics classes and, as a consequence, change teacher roles and responsibilities.[195] In one state, this requirement resulted in hiring academic teachers to teach applied courses and thus threatening vocational teachers with job loss[196]. College entrance eligibility requirements can have similar effects. Policies concerning instructional time and strict adherence to the master schedule also reduce program flexibility[197, 198] as well as do policies controlling curriculum and teacher credentialling.[199] In some states, the need for state approval of new courses has been a barrier.

Organizational structure can influence integration. The most ambitious models of integration–the Academy model, vocational magnets, occupational clusters/majors–were identified in schools with organizational structures that deviated from the norm found in most comprehensive high schools.[200] A dual system of academic and vocational education at all levels in a state led to the adoption of a statewide integration model that reflects and preserves organizational separation and precludes any consideration of restructuring to achieve other paths to integration.[201] Where new organizational changes have been attempted, by placing academic teachers under vocational supervisors, for example, evident tensions result. Nevertheless, organizational changes can help institutionalize the reform and bring about permanent changes.[202]

FUTURE DIRECTIONS FOR INTEGRATION

The literature on integrating academic and vocational education emphasizes secondary school forms of integration and offers program description and anecdotes rather than strong evidence of its potential benefits. This occurs, in part, because integration is a new reform that may take years to implement-especially those models requiring changes in curriculum, pedagogy, and school organization. In addition, proper curriculum and program evaluation is an expensive and difficult business that schools and states are prone to avoid; most simply lack the financial or technical resources required to do it.

Recognizing these shortcomings, the literature provides tentative evidence for the success of some programs and guidance for those charged with implementing integration. Our reading of the literature, the "state of integration" at this time, points to the following conclusions and directions:

1. Available evidence on student outcomes suggest that occupationally-oriented high schools and career academies can raise academic learning,

reduce drop out rates, and instill positive career-related aspirations for students enrolled. These models of integration seem the most promising, but are also the most ambitious in that they require a vision that encourages substantial changes in more traditional forms of schooling. Although the design and implementation of such programs appears to be on the rise, the evident trend is to opt for smaller changes within the vocational curriculum, namely, to adopt off-the-shelf or locally developed "applied academics" curricula, despite insufficient evidence that these materials will improve student outcomes. Presently, we lack sufficient evidence to say which models of integration, if any, should be avoided or used.

2. Implementation difficulties arise regardless of the type of integration attempted. A complex web of policies and practices governs every educational institution-from the schoolhouse to the state-and affects how goals are formulated, how programs are chosen and implemented, and whether desired outcomes are achieved. The litany of barriers is long, and some, such as the long-standing separation between the academic and the vocational, depend on political will to overcome. For those barriers amenable to intervention, the task will be to reallocate resources in ways that help schools and states comply with the Perkins mandate.

Reformers should not underestimate barriers arising from the negative image of vocational education. Nearly every comprehensive high school, for example, tracks students into different curricular programs, based on the belief that, by the time students reach high school, widely varying aspirations, motivations, and abilities of individual students cannot be changed much. Studies show that higher status and more resources go to college-preparation courses, teachers, and students than to their counterparts in general academic and vocational programs.[203] Tracking and the beliefs and pressures supporting it will be difficult to displace without convincing experimental demonstrations of the efficacy of integrated curriculum.

3. The literature suggests that teacher support is key to bringing about changes associated with most models of integration. Teachers need time–apart from instructional time–to collaborate with each other, write or revise curricula, assist in designing programs, and so on. Yet many studies suggest that levels of teacher support for bringing about integration are woefully inadequate. Relatedly, the research to date notes that teacher education programs may not adequately prepare teachers to cope with curriculum changes like integration. The recently reauthorized Higher Education Act has allocated funds for teacher training directed at integration of academic and vocational education. The literature suggests this move is a step in the right direction.

4. The literature concentrates on secondary integration reforms and pays relatively little attention to postsecondary reforms. This imbalance partly

reflects the slower pace of postsecondary institutions to respond to the Perkins mandate. It may also suggest a problem with a piece of legislation that is meant for both secondary and postsecondary educational levels. Post-secondary schools have different concerns, purposes, and funding than secondary schools. Legislation aimed at K-12 schooling may not yield the same consequences at the postsecondary level. Policymakers deliberating vocational education in the future should recognize the potential problems associated with "one size fits all" legislation.

5. While the Perkins legislation mandates integration as an area of program improvement, the regulations provide little direction for state and local policymakers and practitioners. Because program improvement should reflect local conditions and problems, one "model" of integration would not be appropriate. On the other hand, too little guidance has produced a wide variety of responses. The most popular of these–the purchasing and use of off-the-shelf "applied academics" curriculum packages–has not demonstrated improved outcomes thus far. The popularity of these materials, despite limited evidence of their usefulness and questions about their quality, is somewhat disturbing. A cynical explanation is that the availability of funds targeted for integration has created a market for curriculum materials. States that buy in at least demonstrate compliance with the mandate. This approach is defensible, perhaps, if the purchase of applied academics materials represents a first step in a larger, more ambitious plan toward integration.

What the regulations could do is to encourage states and localities to consider more ambitious reforms that go beyond changing content in a single course or program. As noted above, models that require more significant changes in curriculum, pedagogy, students served, and school organization demonstrate positive effects. Without directing greater resources to make broader changes, federal policy can still exert influence as a bully pulpit to expand the vision of what integration of academic and vocational education can yield for many students. Adopting a stronger voice for models of integration that make substantial changes fits with the Perkins Act's historic purpose of encouraging program improvement in vocational education. Andrew and Grubb[204] argue that integration reforms should be incorporated into a vision for reforming the school that includes other reform efforts, such as site-based management and professionalization of teaching. They suggest that connecting integration to other reforms can help make it more attractive, particularly to academic instructors.

6. Finally, evaluations of integrated programs must be conducted in a rigorous and timely manner. In particular, formative evaluations that include classroom observation and ethnographic methods are needed to reveal effective classroom practices associated with teaching and instructional activities. This level of description can help practitioners design potentially

effective programs, or at least go beyond pro forma attempts at integration, such as simply increasing academic content in existing courses. As we have argued earlier[205] the timeline of the current NAVE will not permit adequate implementation and evaluation of many programs initiated with the 1990 amendments. Premature evaluation is not likely to yield positive results, and may send the wrong signal to policy makers. Formative evaluations that can help direct program design or measure interim outcomes or future plans can also yield useful information about program improvement. In the longer term, summative evaluations are needed to judge the effectiveness of more mature programs and to determine which are most promising.

ENDNOTES

[1] Carl T. Perkins Vocational and Applied Technology Act of 1990. (Section 235).

[2] *Ibid.* (Section 240).

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CHAPTER 4

INTEGRATING ACADEMIC AND VOCATIONAL EDUCATION: PROGRESS UNDER THE CARL PERKINS AMENDMENTS OF 1990

W. Norton Grubb and Cathy Stasz

The 1990 Amendments to the Carl Perkins Act required that "funds made available . . . shall be used to provide vocational education in programs that integrate academic and vocational education . . . so that students achieve both academic and occupational competencies." Indeed, this provision in the Amendments can be interpreted as a definition of program improvement, which had previously been the primary emphasis of federal funding for vocational education, and as one of the major revisions of the Amendments. In evaluating the effects of the 1990 Amendments on vocational education, therefore, it is crucial to know whether there have been developments in integration in response to both the funding and the mandate of federal policy.

To accomplish this, the National Assessment of Vocational Education has undertaken a survey of state directors of both secondary and postsecondary vocational education, of school districts, of secondary schools, and of postsecondary institutions providing vocational education (community colleges and technical institutes). In this report, we analyze the survey questions pertaining to the integration of academic and vocational education. The scope of the questions we pose is necessarily limited by the questions asked, of course. In general, the surveys were designed to answer questions like the following:

- What is the scope of integration efforts? What specific types of integration are being undertaken?
- Are some types of states, of districts, of educational institutions more likely to be engaged in integration than others?
- What has been the role of state policy in encouraging both secondary and postsecondary institutions to undertake integration?
- What have been the effects of Perkins funding on state, district, and institutional approaches to integration?

The variety of questions that can be posed is therefore substantial.[1] However, in interpreting any of these results, it is important to keep in mind the limits of questionnaires in answering such questions. That is, the results indicate what state and local administrators *report* that they are doing, not what an independent observer might find. In our prior studies of integration,[2,3] it became clear that claims about educational changes are often exaggerated, and

therefore we might expect the self-reported information about integration from these surveys to be biased in this direction.

Another reason these results are limited concerns the timing of the National Assessment. The NAVE questionnaires, administered by WESTAT, were mailed to states, districts, and educational institutions in the spring of 1992. However, the 1990 Amendments took effect in September 1991, and therefore these questionnaires were being answered during the end of the first academic year governed by the changes. Even under the most favorable conditions, we would not expect the first year of a legislative change to make much difference to educational practices. This is particularly the case with a reform like the integration of academic and vocational education, which was not defined by the Perkins Amendments, and which can take many different forms.[4] In addition, the regulations for the legislation were delayed until fall 1992, causing additional confusion among administrators. There is, then, every reason to think that the initial implementation of the Perkins Amendments, for integration and for all other aspects of the legislation, may have been substantially delayed, particularly for those states and districts that had not initiated integration reforms before the 1990 Amendments. (See Bodily et al.[5] and Grubb et al.[6] for further discussion of early reforms.)

Given these limitations, our tactic has therefore been to stress the *patterns* in the results, since these should be valid as long as any problems in the responses are relatively unbiased. In Section 1, we report state-level policies toward integration in secondary education, reflecting the responses of state directors of secondary vocational education; there was a maximum of 56 responses, from 50 states and several territories. Sections 2 and 3 then address district policies, in comprehensive school districts (with a maximum of 11,232 districts responding) and vocational school districts (with 258 responding) respectively. Section 4 reports the responses of individual secondary schools; a total of 1,735 individual schools responded, including 1,092 comprehensive high schools, 216 vocational high schools, and 427 area vocational schools. Because there are three levels of response, state, district, and school, the links among the three are important, to see whether state policies influence districts practices and whether district actions affect what local schools do.

For postsecondary education, there are two levels of questionnaires: one for state officials (with 48 responses in all), reported in Section 5; and one for individual postsecondary institutions, analyzed in Section 6, for which there were 993 responses. The Conclusion summarizes some of the most important results, and indicates what kinds of issues remain to be investigated.

The results that follow are all drawn from the responses to the NAVE questionnaires. In most but not all cases, we have reproduced the crucial responses in a series of tables included as an appendix, though a few

responses reported in the text cannot be found in these tables. Although these results are based on samples, significance statistics have not been calculated. Therefore all conclusions are based on patterns which are sufficiently strong, or sufficiently consistent across several different questions, that they are unlikely to be due merely to chance.

1. STATE POLICIES: SECONDARY VOCATIONAL EDUCATION

The Carl Perkins Amendments allow states considerable flexibility in shaping approaches to integration. From their responses to the NAVE questionnaire, it is clear that states are becoming increasingly active in undertaking activities related to curriculum integration, as Table 4.1 indicates: in every possible area of state activity, a larger number of states took steps in 1991-92 than in previous years, and even more states plan activities for the coming years. The most common state activity has been to provide curriculum materials from vendors, probably the applied academics curricula (Principles of Technology, Applied Math, and Applied Communication) from CORD and AIT.[7] Funding pilot projects has also been very common, and states are increasingly providing technical assistance as well as in-service training for both vocational and academic teachers. However, most states did not choose to mandate curriculum for integration (row 2 of Table 4.1).

However, a change which is in some ways related to the notion of integrating academic and vocational education, the provision that allows states and localities to fund programs which train students "for all aspects of the occupation in which job openings are projected or available,"[8] has not been as widely adopted. As Table 4.2 indicates, only 18 percent of states had adopted definitions of "all aspects of the industry" by 1991-92, compared to 50 percent that had adopted definitions of integration; and only 54 percent plan to have such a definition by 1992-93, compared to 79 percent for integration. Other activities related to "all aspects of the industry" are similarly smaller in scale than are those related to integration. There are two possible reasons for this difference: the most obvious is that this activity is permitted but not required by the Perkins Amendments, while the Amendments require federal funds to be spent on integration; the other is that there has not been as much information about what "all aspects" might mean and how schools might incorporate this innovation into their curriculum, compared to that available for integration.

By and large, the movement to integrate academic and vocational education has the overwhelming support of vocational administrators, with academic administrators more neutral. Of all the states, 93 percent report that state vocational officials largely support integration, while 5 percent (three states) report neutrality; only one state reported that vocational officials were uninformed, and none reported opposition. Not surprisingly, however, a much

Table 4.1

Proportion of States Reporting Various Integration Activities

Integration Activities	Started before 1991-92	Started or continued in 1991-92	Planned for or continued in 1992-93
Adopt a definition of integration	26.8%	50.0%	78.6%
Provide mandatory curriculum frameworks or guidelines for academic/vocational integration	19.6	21.4	39.3
Provide recommended curriculum frameworks or guidelines for academic/vocational integration	51.8	62.5	80.4
Provide guidelines on the development of coherent sequence of courses	39.3	60.7	83.9
Combine vocational curriculum frameworks with those of academic departments at state level	25.0	39.3	58.9
Provide in-service training for vocational teachers	58.9	82.1	96.4
Provided in-service training for academic teachers	51.8	69.6	89.3
Provide technical assistance for administrators	67.9	80.4	91.1
Help make available applied academics or other integrated course materials from commercial vendors	85.7	91.1	94.6
Develop or disseminate state-developed integrated curricula	44.6	55.4	66.1
Promote participation in a regional consortium, such as SREB, that supports integration	48.2	57.1	64.3
Fund pilot projects that integrate academic and vocational education	71.4	76.8	85.7
Other	12.5	16.1	12.5

N=56

Table 4.2

Proportion of States Reporting Activities Related to "All Aspects of the Industry"

	Done in 1991-92	Planned for 1992-93
Adopt a definition of "all aspects of the industry"	17.9%	53.6%
Provide mandatory curriculum frameworks or guidelines for LEAs/schools to ensure that "all aspects of the industry" are addressed in vocational courses	14.3	41.1
Provide recommended curriculum frameworks or guidelines to help LEAs/schools ensure that "all aspects of the industry" are addressed in vocational courses	25.0	58.9
Issue guidelines for local plan on "all aspects of the industry"	25.0	58.9
Provide in-service training for vocational teachers on "all aspects of the industry"	19.6	55.4
Provide in-service training for guidance counselors on "all aspects of the industry"	14.3	53.6
Other	60.0	80.0

N=56

smaller fraction, 46 percent, reported academic officials largely supportive, while 38 percent were neutral; in 4 states, academic officials are reported to be largely opposed while 5 states reported that they are uninformed. These findings corroborate the reality that the integration of vocational and academic education is a reform effort that has started in vocational education, and has been slower to make its ways into the ranks of academic educators. They also reflect the separation of vocational and academic education at all levels, which is viewed by many as a major barrier to the implementation of integration reforms.[9, 10, 11]

Another way to see the general support for the conception of integration among vocational administrators is to examine the effects of federal funding on state initiatives. It seems reasonable that the dominance of Perkins funds in a state might increase its effort to integrate academic and vocational education, states with relatively high federal funding for vocational education might be more likely to take vigorous steps to integrate, as required by the Perkins Amendments, compared to those where Perkins funds are only a small fraction of resources. However, this proves not to be true: states with low proportions of Perkins funding are as likely as those with high proportions to report the initiatives described in Table 4.1.[12] We infer that the conception of integration has received widespread support in the vocational education community, and is not simply being driven by federal funding and the requirements of the Perkins Amendments.

One other possibility is worth considering; the likelihood that state policies on integrating academic and vocational education have been influenced by other education reform efforts. For example, it is reasonable to think that states that have increased graduation requirements, which are largely requirements for academic coursework, might also have been more active in promoting the integration of academic content into vocational programs, or that states which have seen their vocational programs dwindle might be more energetic in promoting integration as a way of keeping vocational programs in place. (Case study research conducted by NCRVE provides evidence for both of these suppositions.) However, with one important exception, the survey data show little evidence of such relationships. There is some indication that states where vocational education is in relatively good shape, in which enrollments, courses, and funding are increasing, for example, were less likely in 1991-92 to provide mandatory curriculum frameworks or guidelines for integration, while those where vocational enrollments and funding have been declining were more likely to do so.[13] In addition, states reporting increasing vocational enrollments were less likely to report providing any in-service education to academic teachers (as only 29 percent reported) compared to those with stable or declining vocational enrollments (among which 55 percent reported in-service activities for academic teachers). Those with increasing or stable vocational enrollments were also more likely to report combining vocational

curriculum frameworks with those of academic departments, but this was an isolated finding without any other corroboration. We conclude, therefore, that state policies toward integration have been relatively independent of other reform efforts. This tends to corroborate the view that integration has been a reform limited to the vocational side of education, rather than one participating more broadly in general reform movements.

The one important exception is that states with increasing articulation between secondary and postsecondary programs are also more active in setting state policy for integration than are those for whom secondary-postsecondary articulation has not been affected, as Table 4.3 clarifies. (No state reported that such articulation has been decreasing.) To be sure, many of the differences in these tables are relatively small; but cumulatively they suggest that articulation between secondary and postsecondary education, a movement given support by the funding of tech-prep programs in the Perkins Amendments, has tended to be accompanied by greater state efforts to integrate academic and vocational education at the secondary level.

In summary:

- State activities related to the integration of academic and vocational education are increasing.
- States are doing much more to promote integration than they are to support "all aspects of the industry."
- The movement to integrate has the strong support of vocational administrators, with somewhat less support from the academic side.
- Federal funding has not itself been responsible for increasing integration activities, since states with more Perkins funds are not more likely to have engaged in integration. However, the requirements related to integration embedded in the Perkins Amendments may have been influential.
- Integration is preceding relatively independently of other reform efforts, particularly those in academic education.
- States which have promoted the articulation of secondary and postsecondary education, through 2+2 or tech-prep programs, have also been more active in promoting integration.

Table 4.3

Relationship Between Secondary/Postsecondary Articulation and Integration

Integration Activities	Secondary/Postsecondary Articulation: Increase	No change
Adopt a definition of integration	80.9%	71.4%
Provide mandatory curriculum frameworks or guidelines for academic/vocational integration	42.6	14.3
Provide recommended curriculum frameworks or guidelines for academic/vocational integration	83.0	57.1
Provide guidelines on the development of coherent sequence of courses	87.2	57.1
Combine vocational curriculum frameworks with those of academic departments at state level	63.8	28.6
Provide in-service training for vocational teachers	97.9	85.7
Provided in-service training for academic teachers	59.6	0.0
Provide technical assistance for administrators	93.6	85.7
Help make available applied academic or other integrated course materials from commercial vendors	97.9	85.7
Develop or disseminate state-developed integrated curricula	68.1	42.9
Promote participation in a regional consortium, such as SREB, that supports integration	63.8	71.4
Fund pilot projects that integrate academic and vocational education	89.4	85.7
Other	17.0	14.3

N=47

2. SECONDARY SCHOOL DISTRICT POLICIES

At the secondary level, the Perkins Amendments distribute federal funds to school districts that, subject to certain federal restrictions, make decisions about which specific schools shall receive funds, and about how funds are used. Therefore district policies are a crucial intermediary between state-level policies and the programs developed in schools. In this section we report activities in comprehensive school districts, while Section 3 concentrates on vocational school districts, those responsible for vocational high schools and area vocational schools.

Table 4.4 confirms that district-level activities relating to integration have been increasing. Over time, an increasing fraction of districts report holding meetings relating to integration, integrating curricula, developing organizational structures (like academies and clusters) that facilitate integration, providing in-service activities, and the like. The activities most frequently mentioned by districts include holding meetings, developing guidance and counseling activities to promote integration, and integrating curricula across vocational and academic courses, an activity that can range in scale from a pair of teachers working together to large clusters of courses being integrated. Those which were mentioned the least often include the organizational changes which are the most difficult and time-consuming to instigate, including the creation of magnet schools and Academies (or other schools-within-schools). Some of these responses seem unreasonably high,[14] and probably cannot be trusted as indicators of the level of activity in districts; they are probably better indicators of levels of *interest* rather than actual *developments*. Still, they suggest widespread attention to integration and increasing interest over time, with most districts concentrating on the easiest and most accessible activities rather than the most difficult forms like magnet schools and Academies.

For the 39 percent of districts that reported using Perkins funds for staff development, about one third (36 percent) are providing assistance to vocational teachers only, while nearly two-thirds (63 percent) are providing assistance to both academic and vocational teachers. (Only 1 percent report using Perkins funds for academic teachers only.) In addition, 41 percent of districts report using funding other than Perkins resources for assistance in integration, with the majority of these non-Perkins funds (74 percent) going to both academic and vocational teachers. There is a tendency, then, for Perkins funds compared to other resources to be earmarked for vocational teachers only, a pattern which may operate to the detriment of integration if academic teachers need retraining as much as vocational instructors do. On the other hand, these results indicate that districts are reaching beyond federal resources to prepare teachers for integration, a suggestion that federal resources may be leveraging other funding for integration in ways that enable districts to

Table 4.4

Proportion of Comprehensive Districts Reporting Integration Activities

Integration Activities	Started before 1991-92	Started or continued in 1991-92	Planned for or continued in 1992-93
Hold planning meetings to develop policies or procedures for implementing an integrated program	36.8%	61.7%	69.4%
Develop Academies or occupationally-oriented schools within schools	8.6	13.0	18.4
Develop occupationally-oriented magnet or high schools	5.2	7.9	10.7
Develop occupational clusters, career paths, career tracks, or occupational "majors"	24.4	36.2	45.7
Integrate curricula across vocational and academic courses	39.3	59.2	73.8
Develop sequence(s) of integrated vocational and academic courses	34.5	49.7	64.4
Develop guidance and counseling activities to promote integration	38.6	59.9	71.8
Provide in-service training for vocational teachers	30.4	51.4	64.4
Provide in-service training for academic teachers	19.9	40.2	56.9
Evaluate vocational teachers on instruction in mathematics, reading, and/or writing	15.1	22.8	36.9
Other	0.5	1.1	1.3

N=11,232

provide more technical assistance than can be supported through Perkins funds alone.

Although the Perkins Amendments stress serving special needs students, districts are able to make choices about which particular groups of students to serve in their programs. District responses indicate that targeting is a widespread practice: only 19 percent of all districts reported that they did not target any particular groups. Of those districts that did target, the largest number (28 percent) provided integrated programs for vocational students. In addition, 24 percent targeted general-track students, 15 percent targeted academically deficient students, 19 percent targeted potential dropouts, 16 percent targeted disabled students, and 4 percent targeted limited English-proficient (LEP) students. About 10 percent of districts reported emphasizing academically talented students. (For these categories, districts could mention more than one form of targeting, so that these figures do not sum to 100 percent.) These results indicate that the emphasis within the Perkins Amendments on special needs students is being followed by many districts, though of course districts vary in which groups are considered to be most in need of integrated programs. However, there is no evidence that certain types of targeting are more prevalent under certain approaches to integration; for example, districts planning Academies are not more likely to target particular groups of students.

In providing reasons for current efforts to integrate academic and vocational education, state and local reform initiatives were the most frequent responses, with about half of all districts specifying that these were moderate or large influences.[15] The Perkins Amendments were next in importance, with 16 percent of districts mentioning it as moderately instrumental and 25 percent reporting that is was largely instrumental in motivating efforts to integrate. Other potential national and federal influences, the SCANS report (*What Work Requires of Schools*), the report of the National Commission on Education and the Economy (*America's Choice: High Skills or Low Wages*), the America 2000 and the National Goals initiatives of the Bush administration, were only moderately influential. To be sure, some state initiatives in particular have been prompted by the Perkins Amendments, so some of these responses may also reflect indirect responses to the Perkins Amendments. Still, these responses suggest that the federal requirements for integration have acted in concert with other state and local reforms, and in that sense have not been alone in influencing the evident trends in the direction of integrating academic and vocational education. To corroborate this finding, 48 percent of districts reported that the combined effect of major education reforms in the last five years has been to increase the integration of academic and vocational education, while only 4 percent reported a decrease.[16] We note that these results at the district level seem inconsistent with those at the state level in Section 1, which suggested that integration reforms are independent of other state-level reforms. Without

better detail about which specific reforms districts refer to when they report the importance of state and local initiatives, it is unclear what to make of this difference.

However, there is no relationship between the types of state and local reform initiatives and the approach to integration that districts are undertaking, with only one possible exception. Districts in states which have eliminated the baccalaureate degree in education as a requirement for teachers more frequently report that they are supporting in-service training for both academic and vocational teachers, and that they are more likely to be evaluating vocational teachers on their instruction in math, reading, or writing. However, this may be a general response to an influx of new teachers unfamiliar with classroom practices, rather than a response tailored to the movement to integrate academic and vocational education. Otherwise, the approaches to integration described in Table 4.5 are more or less uniform across districts undertaking different types of general reforms.

There are a few indications in these district responses that integration has been stimulated in part by problems districts have experienced in their vocational programs. For example, of those districts reporting a moderate or serious problem in finding vocational teachers with the ability to teach academic subjects, 75 percent initiated integration before 1991-92, compared to 66 percent of those with no such problem with their vocational teachers. Similarly, 74 percent of those reporting moderate or serious problems in maintaining funds for vocational education initiated integration efforts prior to 1991-92, compared to only 60 percent of those with no problem with vocational funds. However, these patterns are not especially strong or consistent across the problems which districts have reported in their vocational programs, and so it is difficult to conclude that such problems are an overwhelming cause of integration initiatives. The most reasonable conclusion is simply that a number of small influences have caused districts to move toward integration, including state and local initiatives as well as problems in finding vocational teachers able to teach academic subjects and maintaining vocational funding.

Other responses about changes in vocational content corroborate the interest in integration. Of all districts, 39 percent report adding applied academics courses, and 37 percent have added other integrated courses or materials; 26 percent also report adding general or transferable skills training, presumably in contrast to very job-specific training, which is consistent with the intent of integration to make vocational programs broader and more widely applicable.[17] In addition, 41 percent claim to have added career exploration, a component that may be related to integration because it enables students to better relate their high school choices, including the choice of an integrated program, to their future occupational plans. However, while these responses may be indicative of a general trend toward more integrated curricula, many

Table 4.5

Proportion of Comprehensive Districts Reporting Integration Activities, by District Size

Integration Activities	Highest quartile	2nd quartile	3rd quartile	Lowest quartile
Hold planning meetings to develop policies or procedures for implementing an integrated program	81.7	73.6	73.4	66.2
Develop Academies or occupationally-oriented schools within schools	27.4	16.7	13.7	19.9
Develop occupationally-oriented magnet or high schools	17.6	10.9	1.8	8.1
Develop occupational clusters, career paths, career tracks, or occupational "majors"	64.9	46.5	38.3	43.6
Integrate curricula across vocational and academic courses	81.4	70.6	70.6	73.3
Develop sequence(s) of integrated vocational and academic courses	73.7	64.6	62.6	57.2
Develop guidance and counseling activities to promote integration	76.0	66.9	71.1	75.2
Provide in-service training for vocational teachers	77.1	60.0	69.7	62.6
Provide in-service training for academic teachers	71.5	55.9	60.1	59.1
Evaluate vocational teachers on instruction in mathematics, reading, and/or writing	38.8	29.8	43.9	42.3
Other	2.4	2.3	0.0	0.0

N=11,232

of these claims seem inflated; for example, in a period when career-oriented guidance and counseling has nearly vanished from most high schools, it is surprising to find 41 percent claiming to have instigated career exploration.[18]

In terms of implementing integration, only 18 percent of districts report that they have a district-level position for a coordinator for integration. Of the few districts who have a coordinator, 25 percent have a full-time coordinator, 10 percent have a half-time coordinator, but most (56 percent) have an individual assigned 10 percent, 20 percent or 30 percent of their time. (Only 2 percent of districts reported more than one coordinator position.) In other words, the vast majority of districts have done nothing at the district level to oversee their integration efforts, and most of those which have assigned coordinators have added integration to the duties of a district administrator with several other responsibilities.

A final question about district activities is whether they are influenced by other characteristics of the district, by its overall size, level of spending per pupil, receipt of Perkins funds, and the composition of its students. While these results are necessarily somewhat erratic, they suggest that the largest districts are more likely to be engaged in virtually every integration activity (with the exception of guidance and the evaluation of vocational teachers), as Table 4.5 clarifies. Evidently, integration has been more common in large, and presumably urban, schools; indeed, it is often difficult to figure out how integration can take place in small schools, since there are fewer courses and teachers, and typically fewer vocational offerings, to provide any basis for integration.

As Table 4.6 reveals, districts with low spending per pupil are less likely than the others to support integration, particularly the development of clusters, or integrated courses, guidance, in-service programs, and vocational teacher evaluation. This is consistent with simple budget constraints, since districts with fewer resources will be less able to fund the kinds of supportive services that integration requires. However, low-spending districts are also the most likely to have higher levels of Perkins funds (Table 4.7), to have more Chapter I students (Table 4.8), to have more minority students (Table 4.9), and to have more vocational students (Table 4.10). Thus low-spending districts also generate more Perkins funding for integration and have more special needs students who might benefit from reform of the curriculum.

As Table 4.7 indicates, districts with a higher proportion of their budgets from Perkins funds are also more likely to engage in integration activities, including planning, magnets, clusters, integrated curricula, coherent sequences of courses, guidance, and in-service activities for both vocational and academic teachers. It would, of course, be distressing if this were not the case, since the purpose of Perkins funding is to enhance vocational improvement through the

Table 4.6

Proportion of Comprehensive Districts Reporting Integration Activities, by Spending Per Pupil

Integration Activities	Highest quartile	2nd quartile	3rd quartile	Lowest quartile
Hold planning meetings to develop policies or procedures for implementing an integrated program	76.9	71.5	80.1	68.5
Develop Academies or occupationally-oriented schools within schools	20.6	16.2	30.1	18.6
Develop occupationally-oriented magnet or high schools	8.1	16.9	8.2	9.1
Develop occupational clusters, career paths, career tracks, or occupational "majors"	51.0	53.9	50.1	41.5
Integrate curricula across vocational and academic courses	80.5	70.7	74.9	73.3
Develop sequence(s) of integrated vocational and academic courses	73.8	57.5	73.7	57.3
Develop guidance and counseling activities to promote integration	80.1	70.7	76.2	65.9
Provide in-service training for vocational teachers	71.7	68.6	74.7	58.7
Provide in-service training for academic teachers	67.1	63.6	66.7	52.3
Evaluate vocational teachers on instruction in mathematics, reading, and/or writing	46.4	42.3	37.5	33.1
Other	1.1	1.3	0.1	2.7

N=11,232

Table 4.7

Proportion of Comprehensive Districts Reporting Integration Activities, by Percent of Funding From Perkins

Integration Activities	Highest quartile	2nd quartile	3rd quartile	Lowest quartile
Hold planning meetings to develop policies or procedures for implementing an integrated program	76.8	87.3	83.8	58.1
Develop Academies or occupationally-oriented schools within schools	21.6	28.8	18.2	18.1
Develop occupationally oriented magnet or high schools	14.3	14.8	7.5	6.2
Develop occupational clusters, career paths, career tracks, or occupational "majors"	61.5	57.9	52.5	33.6
Integrate curricula across vocational and academic courses	81.9	90.7	79.6	54.5
Develop sequence(s) of integrated vocational and academic courses	76.8	81.2	62.7	46.7
Develop guidance and counseling activities to promote integration	81.0	86.1	74.2	56.7
Provide in-service training for vocational teachers	71.6	83.7	77.3	49.1
Provide in-service training for academic teachers	64.3	76.8	67.4	45.4
Evaluate vocational teachers on instruction in mathematics, reading, and/or writing	52.5	45.5	34.6	28.2
Other	1.8	2.5	0.5	1.0

N=11,232

Table 4.8

Proportion of Comprehensive Districts Reporting Integration Activities, by Percent of Chapter 1 Students

Integration Activities	Highest quartile	2nd quartile	3rd quartile	Lowest quartile
Hold planning meetings to develop policies or procedures for implementing an integrated program	78.7	77.2	66.2	68.2
Develop Academies or occupationally-oriented schools within schools	19.8	14.4	21.6	20.2
Develop occupationally-oriented magnet or high schools	7.6	9.2	11.5	14.2
Develop occupational clusters, career paths, career tracks, or occupational "majors"	57.0	51.9	45.3	39.9
Integrate curricula across vocational and academic courses	78.8	78.6	75.0	73.2
Develop sequence(s) of integrated vocational and academic courses	68.0	68.9	63.9	64.4
Develop guidance and counseling activities to promote integration	78.3	76.5	70.6	72.0
Provide in-service training for vocational teachers	79.4	64.1	70.5	65.3
Provide in-service training for academic teachers	72.1	62.3	61.8	55.3
Evaluate vocational teachers on instruction in mathematics, reading, and/or writing	53.8	40.0	40.2	33.5
Other	2.4	2.8	0.3	0.6

N=11,232

Table 4.9

Proportion of Comprehensive Districts Reporting Integration Activities, by Percent of Minority Students

Integration Activities	Highest quartile	2nd quartile	3rd quartile	Lowest quartile
Hold planning meetings to develop policies or procedures for implementing an integrated program	80.0%	80.2%	67.8%	71.7%
Develop Academies or occupationally-oriented schools within schools	31.5	22.9	9.8	18.0
Develop occupationally-oriented magnet or high schools	20.4	15.4	6.7	9.2
Develop occupational clusters, career paths, career tracks, or occupational "majors"	65.3	60.5	38.5	42.4
Integrate curricula across vocational and academic courses	90.5	80.3	67.7	74.5
Develop sequence(s) of integrated vocational and academic courses	81.4	73.2	57.9	63.7
Develop guidance and counseling activities to promote integration	82.9	76.5	64.9	76.2
Provide in-service training for vocational teachers	81.7	77.6	54.9	67.4
Provide in-service training for academic teachers	75.6	69.1	50.9	60.8
Evaluate vocational teachers on instruction in mathematics, reading, and/or writing	57.6	38.0	30.4	37.8
Other	1.5	2.3	1.0	1.2

N=11,232

mechanisms of integrating and vocational education. On other dimensions, these results can be read both positively and negatively. While districts with low levels of Perkins funding are less likely to be engaged in specific integration activities, virtually all of them, 90 percent, report that they are doing or planning something related to integration; clearly, this is a movement for reform that is not entirely dependent on the funding and requirements provided by the Perkins Amendments. On the other hand, 14 percent of those districts receiving the highest relative amounts of Perkins resources report that they are not presently engaged in or planning any activities related to integration. Evidently, there are still some districts which, despite receiving relatively large amounts of federal resources, are still going on with business as usual, and have not yet learned about the requirement to support integrated programs.

Table 4.8 shows that districts with high proportions of Chapter 1 students, that is, low-income students eligible for compensatory education, are somewhat more likely to engage in most activities related to integration, particularly in planning meetings, in developing clusters, in providing in-service programs, and in evaluating vocational instructors; and they are the least likely to report no integration efforts at all. (They are also less likely than districts with lower proportions of Chapter I students to be developing magnet schools, a curious finding which is difficult to explain.[19]) Of course, these results overlap considerably with those in Table 4.7, since Perkins funds are determined in part by counts of low-income students. They confirm that the intentions behind the Perkins formulas, to direct more resources to districts with high numbers of special-need students, including low-income students, for purposes of vocational program improvement, are indeed being met.

Finally, Table 4.10 confirms that efforts to integrate academic and vocational integration are somewhat more common in districts with high proportions of vocational students. However, the pattern is not monotonic. While districts with the lowest proportions of vocational students (in column 4) are the least likely to be undertaking most integration activities, and are the most likely not be undertaking integration at all, districts which are most likely to be integrating are in the second quartile (column 2), with substantial proportions of vocational students but not the highest proportions. Districts with the highest proportions of vocational students (in column 1) are somewhat less likely than those in the second quartile to be involved in integration, though considerably more so than districts in the lowest or third quartile. This implies that districts with low proportions of vocational students are least likely to integrate, because there is likely to be little vocational education to integrate with academic instruction; and while districts with the highest proportions of vocational students are more likely to be integrating, they are somewhat more likely to leave their vocational programs alone, that is, to continue

Table 4.10

Proportion of Comprehensive Districts Reporting Integration Activities, by Percent of Vocational Students

Integration Activities	Highest quartile	2nd quartile	3rd quartile	Lowest quartile
Hold planning meetings to develop policies or procedures for implementing an integrated program	77.8	87.0	67.1	69.0
Develop Academies or occupationally-oriented schools within schools	26.6	25.5	15.3	12.0
Develop occupationally-oriented magnet or high schools	14.8	17.5	5.7	10.2
Develop occupational clusters, career paths, career tracks, or occupational "majors"	29.3	60.4	45.1	40.6
Integrate curricula across vocational and academic courses	68.4	94.5	74.0	64.7
Develop sequence(s) of integrated vocational and academic courses	61.4	77.3	61.4	61.9
Develop guidance and counseling activities to promote integration	81.2	87.0	65.8	60.5
Provide in-service training for vocational teachers	67.7	82.6	57.3	55.8
Provide in-service training for academic teachers	60.6	78.9	43.2	49.1
Evaluate vocational teachers on instruction in mathematics, reading, and/or writing	28.4	50.8	37.3	26.0
Other	0.0	0.3	2.6	2.2

N=11,232

conventional vocational programs separated from the academic track, than are districts with moderately high proportions of vocational students.

The Relation Between State Policy and District Activities

An important general question is what the relationship is between state policies on integration and district efforts. Overall, 17 percent of districts report that state support for integrated programs is very good, while 46 percent report it to be adequate and 31 percent report that their states gave them little or no support. Corroborating this pattern, 9 percent reported large increases in the amount of support for integration between 1990-91 and 1991-92 and 35 percent reported some increases; however, 48 reported no change and 7 percent reported a decrease, a discouraging finding because of the strong emphasis in the Perkins Amendments on integration. State efforts related to "all aspects of the industry" are somewhat weaker (consistent with response from state-level officials in the previous section): only 8 percent of districts report very good support and 38 percent adequate support, while 45 percent report that their states provided little or no support; and only 25 reported an increase in resources for "all aspects of the industry."

One form of state help is the provision of in-service programs: 31 percent of districts reported that their states provided in-service programs related to integration, while only 12 percent reported that states provided in-service activities related to "all aspects of the industry." Since 24 percent of districts provided local in-service training about integration, and 5 percent on "all aspects of the industry," it is clear that states have been more active than districts in sponsoring in-service activities. However, the survey data provide no clues about the duration or quality of these in-service activities.

Furthermore, there is striking evidence in these results that the level of state support makes a difference to local activities. Table 4.11 summarizes the evidence: Districts which report that their state provided very good support for integration are much more likely to have undertaken various specific activities related to integration, compared to districts in states with little or no support; and they tended to undertake them earlier, priori to 1991-92, whereas districts in unsupportive states were more likely to report beginning their initiatives in 1991-92. The differences are especially marked for some of the more substantial approaches to integration: for example, 35 percent of districts in supportive states are planning Academies, 18 percent are planning magnet schools, and 69 percent are planning clusters, compared to only 10 percent, 9 percent, and 42 percent in unsupportive states.[20]

There is a similar pattern (though more erratic) for districts reporting increased state financial support for integration also to report more local activity related to integration efforts (reported in Table 4.12). We conclude, then, that state

Table 4.11

Proportion of Comprehensive Districts Reporting Integration Activities, by Level of State Support

Integration Activities	Very good support	Adequate support	Little or no support
Hold planning meetings to develop policies or procedures for implementing an integrated program	88.0%	78.5%	64.4%
Develop Academies or occupationally-oriented schools within schools	35.4	21.0	10.3'
Develop occupationally-oriented magnet or high schools	18.4	9.1	8.5
Develop occupational clusters, career paths, career tracks, or occupational "majors"	68.5	47.7	41.7
Integrate curricula across vocational and academic courses	87.2	77.7	70.4
Develop sequence(s) of integrated vocational and academic courses	76.3	67.9	61.6
Develop guidance and counseling activities to promote integration	81.1	77.7	65.6
Provide in-service training for vocational teachers	84.2	76.9	51.2
Provide in-service training for academic teachers	80.9	69.5	45.8
Evaluate vocational teachers on instruction in mathematics, reading, and/or writing	58.5	38.0	32.4
Other	0.8	1.2	1.4

N=11,232

Table 4.12

Proportion of Comprehensive Districts Reporting Integration Activities, by Level of State Support for Integration

Integration Activities	Large increase	Some increase	No change	Some decrease	Large decrease
Hold planning meetings to develop policies or procedures for implementing an integrated program	94.4%	86.6%	59.8%	73.2%	42.2%
Develop Academies or occupationally-oriented schools within schools	31.8	18.8	14.9	40.5	7.3
Develop occupationally-oriented magnet or high schools	19.1	9.0	8.1	41.7	20.0
Develop occupational clusters, career paths, career tracks, or occupational "majors"	56.0	56.5	38.0	65.7	35.8
Integrate curricula across vocational and academic courses	93.9	86.4	64.8	79.3	60.0
Develop sequence(s) of integrated vocational and academic courses	86.4	75.3	56.0	70.2	48.8
Develop guidance and counseling activities to promote integration	94.5	84.0	62.3	83.7	71.6
Provide in-service training for vocational teachers on integration	99.6	81.5	53.1	70.2	36.0
Provide in-service training for academic teachers on integration	88.6	75.5	47.1	64.2	36.0
Evaluate vocational teachers on instruction in mathematics, reading, and/or writing	52.8	41.6	32.6	50.4	33.7
Other	0.9	1.5	1.2	0.0	5.5

N=11,232

support for integration makes a substantial difference to district activities, and indeed state support is virtually the only powerful influence on the extent of integration efforts.

However, on other dimensions state policies appear to make no difference to district-level policies. For example, it is reasonable to think that states which have increased academic requirements for graduation, or which have imposed proficiency exams for students, would lead to greater district efforts to integrate academic and vocational education, at least for vocational students. However, such patterns do not emerge from the district responses: the various district practices revealed in Table 4.4 are remarkably uniform across states with different approaches to general school reform.

In sum, the important findings about district-level policies related to the integration of academic and vocational education in comprehensive school districts include the following:

- Interest in activities related to integration is high and increasing over time.
- Integration activities are more likely in large districts, in districts with a high proportion of their resources from Perkins funds, and in those with high proportions of Chapter 1 students and vocational students. This suggests that the direction of Perkins funds to districts with special-needs students in order to promote integration activities does tend to happen.
- State policies have a distinct effect on integration activities, which are more likely to occur in states with good support for integration and with increased financial support for integration.

3. DISTRICT-LEVEL POLICIES: VOCATIONAL DISTRICTS

It is reasonable to expect that vocational school districts, those that operate vocational high schools and area vocational schools, as distinct from districts that operate comprehensive high schools, might take a different approach to integration. These districts have, after all, greater resources for vocational education, and all their students are vocational students. However, some of them have very few academic instructors and offer few or no academic courses, and in these cases the integration of academic and vocational education may be difficult indeed. On the other hand, some vocational districts operate comprehensive vocational secondary schools with both academic and vocational instructors, and in these integration may be easier to achieve because of the occupational focus of the school. In these surveys, 21 percent of vocational districts respond that they operate vocational high schools that also

teach academic subjects. Thirty-three percent operate area or regional vocational schools with secondary schools only and 58 percent operate area vocational schools with both secondary and postsecondary students, institutions that have relatively few academic instructors and for whom integration is potentially more difficult.

Table 4.13 presents the responses of these districts about a range of activities related to integrating academic and vocational education. Like Table 4.4 for comprehensive school districts, the results indicate that activities related to integration are increasing over time. The levels of these activities are somewhat higher than for comprehensive districts: for example, 66 percent of vocational districts report that they have developed occupational clusters, compared to 36 percent of comprehensive school districts, and 81 percent integrate vocational and academic courses, compared to 59 percent of comprehensive districts. The levels of activities supporting integration, and the numbers reporting in-service training for vocational teachers, are especially high in vocational districts.

Of those districts providing in-service training, 77 percent reported providing such training for academic and vocational teachers, while 21 percent provided in-service for vocational instructors only. (Only 2 percent reported training only for academic instructors.) Similarly, 75 percent of districts using other funds for in-service training provided it for both academic and vocational teachers, while only 23 percent used such funds for vocational teachers only. Evidently, then, there is a clear tendency to include academic as well as occupational teachers, a combination that is often crucial to the success of integration efforts.

Corroborating the frequency of in-service activities, 59 percent of these districts reported local provision of in-service activities related to integration, and 41 percent report such activities under state sponsorship. Locally-sponsored in-service activities related to "all aspects of the industry" were reported by 17 percent of districts, and 10 percent reported state sponsorship of such activities by their states. Once again, activities related to "all aspects" are substantially less frequent than are those related to integration itself. In addition, local provision of in-service activity is somewhat more common than state sponsorship, though evidently both levels have been somewhat active in providing in-service education related to integration.

In addition to these activities, 60 percent of vocational districts report that they have increased the use of Applied Academics courses, 65 percent have increased the use of other integrated course materials, 47 percent report that they have expanded the use of general or transferable skills training (in place of more specific and non-transferable training). Almost no districts responded that they reduced the use of these approaches. Again, these are consistent with a shift to more general and more integrated forms of vocational instruction.

Table 4.13

Proportion of Vocational Districts Reporting Integration Activities

Integration Activities	Started before 1991-92	Started or continued in 1991-92	Planned for or continuing in 1992-93
Hold planning meetings to develop policies or procedures for implementing an integrated program	61.6%	86.4%	93.0%
Develop Academies or occupationally-oriented schools within schools	14.7	25.2	31.0
Develop occupationally oriented magnet or high schools	16.3	17.8	24.0
Develop occupational clusters, career paths, career tracks, or occupational "majors"	50.4	65.9	74.4
Integrate curricula across vocational and academic courses	55.4	81.4	89.5
Develop sequence(s) of integrated vocational and academic courses	46.9	71.3	84.5
Develop guidance and counseling activities to promote integration	47.7	70.5	81.0
Provide in-service training for vocational teachers on integration	46.1	71.3	89.1
Provide in-service training for academic teachers on integration	34.9	58.9	77.9
Evaluate vocational teachers on instruction in mathematics, reading, and/or writing	22.5	30.6	53.9
Other	3.1	2.7	2.7

N=258

Of the possible sources of motivation for district integration efforts, the Perkins Amendments are clearly the most important: 31 percent of districts reported that this legislation was largely responsible for integration, and an additional 24 percent that it was moderately responsible; 37 percent reported that it was slightly or not at all important. In contrast, very few reported that others sources were largely instrumental, 10 percent for the SCANS report, 9 percent for *America's Choice*, 10 percent for American 2000, and 7 percent for the national goals initiatives. In addition, 27 percent reported state initiatives were largely responsible and 37 percent that local reform initiatives were important, but since these initiatives may simply refer to initiatives related to integration (as we will see more clearly below), they don't provide much additional information about what has caused districts to support integration.

Another source of motivation is the district conception of vocational education. Among those who report that "preparing students for specific occupations" is one of the three most important goals, 63 percent reported no integration, compared to only 5 percent of other districts. In addition, districts reporting that they intend to prepare students for further education or training, or ensure that students master basic skills, both goals that might be thought especially important in districts with a conventionally "academic" or college-oriented focus, more often reported that they had made no plans for integration (38 percent and 44 percent respectively). This suggests that districts with the goals of "traditional" vocational education, job-specific education, and those with the goals of "traditional" college prep programs are less likely to engage in integration. Indeed, this is quite consistent with the notion of integration, which intends to abandon the goals of the conventional split between vocational and academic purposes to move toward a hybrid.

Of vocational districts, 15 percent reported that they have targeted academically talented students, 30 percent targeted academically deficient students, 27 percent targeted potential dropouts, 23 percent emphasized disabled students, and 10 percent focused on LEP students. Since districts could target more than one group of students, these responses are not mutually exclusive; indeed, 40 percent of districts reported that they did not target any particular groups. Compared to comprehensive school districts, these results suggest a greater emphasis on students with special needs. However, this is probably because comprehensive districts are likely to target vocational students, while vocational districts would not give this response since all of their students are vocational. One final result is that there are no powerful relations between the kinds of students targeted and the types of integration activities that districts promote.

In order to carry out their coordination activities, 31 percent of vocational districts have a position for a coordinator of vocational-academic integration, a higher fraction than among comprehensive districts, among which only 18

percent have a coordinator. A majority of these coordinators, 54 percent, have been hired since 1989, indicating the very recent interest in coordination, though 20 percent report hiring such coordinators during the 1960s and 1970s. (We suspect that these are likely to be administrators within comprehensive vocational institutions who are in charge of academic instruction, rather than individuals charged with integration itself.)

Furthermore, in vocational districts a larger fraction of coordinators are full-time or more: of those with a coordinator, 40 percent are full-time and 15 percent have more than a full-time coordinator; an additional 17 percent have between a half-time and full-time coordinator, and only 27 percent have less than a half-time coordinator (compared to 56 percent among comprehensive districts). In this sense, vocational districts are taking integration more seriously than are comprehensive school districts. While this finding is perhaps not surprising, it is an indication that vocational education is changing more substantially in those places where it is the most concentrated.

When we examine what kinds of vocational districts are most likely to engage in integration, some patterns emerge that are similar to those for comprehensive districts. As Table 4.14 indicates, larger districts are more likely to report integration, especially in the forms of Academies, occupational clusters, sequences of courses, and in-service training. The results in Table 4.15 indicate that districts with higher expenditures per pupil are also more likely to be engaged in integration, not surprisingly, particularly for magnet schools, integrated curricula, and guidance and counseling. The exception is the development of Academies.

In Table 4.16, the results by different levels of Perkins funds for vocational students are presented. They indicate that most integration activities, particularly occupationally-oriented magnet schools, guidance and counseling, in-service training for academic teachers, and the evaluation of vocational teachers in academic subjects, is more prevalent in districts with relatively high level of Perkins funds, implying that federal funding has to some extent been effective in supporting additional attention to integration. However, as in Table 4.15, there are some exceptions to these patterns: districts with high proportions of Perkins funds are *less* likely to support Academies and occupational clusters, for example. One interpretation is that support for Academies may come from sources other that the Perkins funds, e.g., from state funding (as in California), from special project funding, from private sources (as in support for financial Academies by American Express), and that such funding is more likely to flow to districts without access to other resources like Perkins funds. From this vantage, then, it is not surprising to find certain types of integration following patterns quite different from other types.

Table 4.14

Proportion of Vocational Districts Reporting Integration Activities, by District Enrollment

Integration Activities	District Enrollment			
	Lowest quartile	2nd quartile	3rd quartile	Highest quartile
Hold planning meetings to develop policies or procedures for implementing an integrated program	93.5	96.7	96.3	100.0
Develop Academies or occupationally-oriented schools within schools	18.5	36.7	37.0	76.9
Develop occupationally oriented magnet or high schools	18.5	30.0	40.7	23.1
Develop occupational clusters, career paths, career tracks, or occupational "majors"	75.9	73.3	77.8	84.6
Integrate curricula across vocational and academic courses	90.7	95.0	88.9	92.3
Develop sequence(s) of integrated vocational and academic courses	83.3	83.3	92.6	92.3
Develop guidance and counseling activities to promote integration	85.2	78.3	81.5	84.6
Provide in-service training for vocational teachers on integration	90.7	88.3	96.3	100.0
Provide in-service training for academic teachers on integration	77.8	83.3	77.8	84.6
Evaluate vocational teachers on instruction in mathematics, reading, and/or writing	62.0	40.0	59.3	61.5
Other	3.7	3.3	7.4	0.0

N=258

Table 4.15

Proportion of Vocational Districts Reporting Integration Activities, by District Expenditure Per Pupil

Integration Activities	District Expenditure Per Pupil			
	Lowest quartile	2nd quartile	3rd quartile	Highest quartile
Hold planning meetings to develop policies or procedures for implementing an integrated program	96.6	93.0	97.9	97.6
Develop Academies or occupationally-oriented schools within schools	48.3	27.9	23.4	31.0
Develop occupationally oriented magnet or high schools	24.1	14.0	17.0	35.7
Develop occupational clusters, career paths, career tracks, or occupational "majors"	79.3	62.8	74.5	84.5
Integrate curricula across vocational and academic courses	82.8	95.3	95.7	92.9
Develop sequence(s) of integrated vocational and academic courses	89.7	83.7	87.2	86.9
Develop guidance and counseling activities to promote integration	75.9	76.7	85.1	89.3
Provide in-service training for vocational teachers on integration	96.6	86.0	93.6	92.9
Provide in-service training for academic teachers on integration	82.8	72.1	76.6	86.9
Evaluate vocational teachers on instruction in mathematics, reading, and/or writing	55.2	62.8	46.8	58.3
Other	10.3	0.0	6.4	2.4

N=258

Table 4.16

Proportion of Vocational Districts Reporting Integration Activities, by Level of Perkins Funds Per Vocational Student

Integration Activities	Perkins Funds Per Vocational Student			
	Lowest quartile	2nd quartile	3rd quartile	Highest quartile
Hold planning meetings to develop policies or procedures for implementing an integrated program	100.0	95.8	98.1	98.7
Develop Academies or occupationally-oriented schools within schools	45.0	45.8	20.4	32.9
Develop occupationally oriented magnet or high schools	20.0	25.0	20.4	30.4
Develop occupational clusters, career paths, career tracks, or occupational "majors"	90.0	87.5	83.3	73.4
Integrate curricula across vocational and academic courses	90.0	87.5	98.1	94.9
Develop sequence(s) of integrated vocational and academic courses	90.0	91.7	83.3	86.6
Develop guidance and counseling activities to promote integration	65.0	87.5	87.0	88.6
Provide in-service training for vocational teachers on integration	90.0	95.8	96.3	93.7
Provide in-service training for academic teachers on integration	70.0	83.3	88.9	82.3
Evaluate vocational teachers on instruction in mathematics, reading, and/or writing	40.0	58.3	59.3	59.5
Other	10.0	0.0	3.7	3.8

N=250

Finally, Table 4.17 reveals that vocational districts with high proportions of minority students are *less* likely to engage in integration activities, with the exception, once more, of Academies, many of which have been intended to serve at-risk students. This is the reverse of the pattern for comprehensive districts, in Table 4.9. It is puzzling in the light of the finding (in Table 4.16) that Perkins funding, which is allocated according to the numbers of special-needs students, does influence integration activities, and should therefore result in more integration in districts with more minority students. However, it may be that the composition of vocational districts is such that special needs students are less likely to be minority (and perhaps more likely to be handicapped students, for example).[21]

The Effects of State Policies

As for comprehensive high school districts, an important issue for vocational districts is the relationship between state policies and district initiatives related to integration. Of all vocational districts, 26 percent reported that state support for integration is very good, with another 45 percent claiming that state support is adequate; but 25 percent reported little or no state support. The *change* in state support from 1990-91 to 1991-92, i.e., with the introduction of Perkins funds intended to promote integration, was reported to be large by 12 percent of districts and moderate by 49 percent; 31 percent reported no change, while only 5 percent reported a moderate decline and 2 percent a large decline. As we have already seen for comprehensive districts, support for "all aspects of the industry" is much lower: 12 percent reported state support to be very good, 32 report it to be adequate, and fully 50 percent report little or no state support. Similarly, only 3 percent reported a large increase in state activity between 1990-91 and 1991-92, with some increase in 24 percent of districts; but 63 percent recorded no change and 7.7 percent actual decreases in state support.

However, contrary to the case for comprehensive schools districts, these reported levels of state support do not affect the extent or types of integration activities undertaken by vocational districts. While there are a few differences, for example, 85 percent of districts reporting "very good" state support funded guidance and counseling related to integration, compared to 75 percent of districts reporting little or no state support, the differences are small, statistically insignificant, and sometimes erratic.

Similarly, when the responses of vocational districts are linked with the reports of state directors of vocational education in their respective states, there is no relationship between the types of activities supported by states (as described in Table 4.1 above) and those reported by vocational districts (e.g., as reported in Table 4.13).

Table 4.17

Proportion of Vocational Districts Reporting Integration Activities, by Proportion of Minority Students

Integration Activities	Proportion of Minority Students			
	Lowest quartile	2nd quartile	3rd quartile	Highest quartile
Hold planning meetings to develop policies or procedures for implementing an integrated program	94.6	98.2	100.0	91.1
Develop Academies or occupationally-oriented schools within schools	26.8	32.1	26.8	46.4
Develop occupationally oriented magnet or high schools	26.8	25.0	26.8	26.8
Develop occupational clusters, career paths, career tracks, or occupational "majors"	76.8	78.6	73.2	76.8
Integrate curricula across vocational and academic courses	96.4	92.9	96.4	85.7
Develop sequence(s) of integrated vocational and academic courses	94.6	83.9	91.1	80.4
Develop guidance and counseling activities to promote integration	91.1	82.1	87.5	80.4
Provide in-service training for vocational teachers on integration	91.1	94.6	96.4	89.3
Provide in-service training for academic teachers on integration	87.5	82.1	83.9	75.0
Evaluate vocational teachers on instruction in mathematics, reading, and/or writing	69.6	50.0	53.6	53.6
Other	0.0	3.6	10.7	1.8

N=258

Finally, we can examine districts according to the fraction of overall state funds for vocational education that come from Perkins resources. Of districts that fall in the lowest quartile of total Perkins resources, 21 percent reported no integration, compared to 2 percent in the second quartile, 12 percent in the third quartile, and 15 percent in the fourth quartile, suggesting that states with low fractions of vocational resources from federal funds are less likely to have integration-related activities in their vocational districts. However, these results are relatively weak and erratic, there is, for example, no clear relationship between the importance of Perkins funds and the types of integration activities (as described in Table 4.13). We conclude, therefore, that there has been widespread support for integration activities within vocational districts, less influenced by state support than is the case for comprehensive districts.

In summary, we have found the following patterns for vocational districts:

- Vocational districts are doing more than comprehensive districts to integrate academic and vocational education, as measured by the frequency of integration activities and the commitment to coordinators, than are comprehensive school districts.

- Integration activities tend to be more frequent in vocational school districts that are larger, in those with higher expenditures per pupil, and those with fewer minority students.

- Integration in vocational districts is more common in districts with relatively higher levels of Perkins funds per pupil, suggesting that the intent of increasing integration through federal resources is being met.

- The effects of state policies on integration in vocational school districts is not especially notable. This may be, however, because support for integration is quite widespread.

4. SECONDARY SCHOOLS

Of course, state- and district-level policies may enhance the ability of local schools to integrate academic and vocational education. However, in the end the success of the effort to stimulate integration depends on whether individual schools and the teachers within them have incorporated integration into their everyday practices and classrooms. In this section we report on the results from individual schools about what approaches to integrating academic and vocational education they have taken.

In many of these results, we distinguish among comprehensive high schools, which represented 1,092 or 63 percent of the schools responding to the survey; vocational high schools, which numbered 216 or 12 percent of schools; and area vocational schools, which were 427 or 25 percent of the sample. These different types of high school may have taken different approaches to integration, partly because the amount of vocational education varies dramatically among these three types of schools.

Tables 4.18, 4.19, and 4.20 present the most basic information about the frequency of different approaches to integration. As in previous results (i.e., in Tables 4.1, 4.5, and 4.13), there is a distinct pattern of increasing activity. In addition, it is clear that integration activities are more common in vocational high schools and area vocational schools than in comprehensive high schools. There is, to be sure, some reason to think that the levels of these responses may be exaggerated; for example, 37 percent of comprehensive high schools, 52 percent of vocational high schools, and 45 percent of area vocational schools claimed that they would institute common planning periods in 1992-93 for academic and vocational teachers to collaborate on integration, figures that seem unrealistically high.[22] Otherwise, the trend and pattern of activities in these tables seem reasonable.

However, up to this point it appears that integration is an activity that has taken place without much collaboration between academic and vocational instructors. Of all high schools, 43 percent (including 46 percent of comprehensive high schools, 26 percent of vocational high schools, and 37 percent of area vocational schools) indicated that vocational and academic teachers do not work together to develop and implement integrated courses. Another 42 percent indicated that collaboration does take place, but without a regular schedule, suggesting a catch-as-catch-can approach to collaboration. Four percent reported that teachers spend less than an hour per week in collaboration, 3 percent reported one to two hours per weeks, and slightly less than 3 percent reported spending more than that. By and large, then, we infer that the integration of academic and vocational content is something which teachers have carried out individually, rather than through collaboration with others, and there has been relatively little effort to ensure that teachers collaborate regularly.

When teachers do collaborate, 36 percent of schools reported that they work to develop academic materials to incorporate into vocational courses, and 29 percent reported that they develop applied academic materials for incorporation into academic courses. In addition, 25 percent claimed that teachers were developing cross-curriculum efforts, of which Writing across the Curriculum is the best known. These are all examples of making modifications to existing courses, but without changing the basic structure of programs; in some cases, we can presume that the modifications are quite minor. Only 18

Table 4.18
Proportion of Comprehensive High Schools Reporting Integration Activities

Integration Activities	Started before 1991-92	Started or continued in 1991-92	Planned for or continuing in 1992-93
Incorporate employability or generic work force skills into vocational curricula	61.1%	63.2%	70.6%
Develop integrated curricula across vocational and academic courses	33.8	43.0	59.7
Develop sequence of integrated vocational and academic courses	31.0	38.7	55.3
Use applied academics or other integrated curricula from commercial vendors (e.g. Principles of Technology)	19.9	30.0	44.2
Use cross-curriculum materials (e.g., Writing Across the Curriculum)	34.1	40.4	49.9
Establish procedures for collaboration between academic and vocational teachers to develop integrated course offerings	27.1	41.3	60.3
Provide common planning periods for vocational and academic teachers to work on integration	14.0	16.6	32.3
Increase time available to teachers to work on integrated courses	8.1	15.6	29.8
Provide "tandem courses" where students take coordinated vocational and academic courses	14.0	18.6	33.4
Provide interdisciplinary courses combining occupational issues and academic disciplines (e.g., History of Technology, Society and Technology, The Literature of Work)	10.4	12.6	25.8
Other	0.3	0.7	1.1

N=1,092

Table 4.19

Proportion of Vocational High Schools Reporting Integration Activities

Integration Activities	Started before 1991-92	Started or continued in 1991-92	Planned for or continuing in 1992-93
Incorporate employability or generic work force skills into vocational curricula	72.3%	74.8%	85.5%
Develop integrated curricula across vocational and academic courses	51.6	63.4	81.9
Develop sequence of integrated vocational and academic courses	41.7	52.3	72.4
Use applied academics or other integrated curricula from commercial vendors (e.g. Principles of Technology)	40.8	50.2	67.2
Use cross-curriculum materials (e.g., Writing Across the Curriculum)	46.2	49.1	61.4
Establish procedures for collaboration between academic and vocational teachers to develop integrated course offerings	37.7	51.6	73.8
Provide common planning periods for vocational and academic teachers to work on integration	27.7	30.5	49.1
Increase time available to teachers to work on integrated courses	15.2	25.0	37.0
Provide "tandem courses" where students take coordinated vocational and academic courses	30.2	32.9	42.9
Provide interdisciplinary courses combining occupational issues and academic disciplines (e.g., History of Technology, Society and Technology, The Literature of Work)	14.2	19.4	32.9
Other	0.5	1.3	1.4

N=216

Table 4.20

Proportion of Area Vocational Schools Reporting Integration Activities

Integration Activities	Started before 1991-92	Started or continued in 1991-92	Planned for or continuing in 1992-93
Incorporate employability or generic work force skills into vocational curricula	82.9%	84.1%	86.1%
Develop integrated curricula across vocational and academic courses	44.3	65.8	81.0
Develop sequence of integrated vocational and academic courses	32.6	50.9	72.6
Use applied academics or other integrated curricula from commercial vendors (e.g. Principles of Technology)	32.2	43.5	60.1
Use cross-curriculum materials (e.g., Writing Across the Curriculum)	21.9	31.2	44.4
Establish procedures for collaboration between academic and vocational teachers to develop or implement integrated course offerings	34.2	58.9	76.7
Provide common planning periods for vocational and academic teachers to work on integration	13.5	24.1	40.9
Increase time available to teachers to work on integrated courses	15.5	27.0	46.9
Provide "tandem courses" where students take coordinated vocational and academic courses	17.7	24.7	46.4
Provide interdisciplinary courses combining occupational issues and academic disciplines (e.g., History of Technology, Society and Technology, The Literature of Work)	7.3	9.5	25.2
Other	0.6	1.0	1.0

N=427

percent reported that teachers were developing new courses, 12 percent that they were developing tandem courses, and 13 percent that they were team teaching, suggesting that schools have not yet found the resources or the motivation to pursue the most thorough forms of integration. At the same time, 21 percent of all schools (including 26 percent of vocational high schools and 39 percent of area vocational schools) strongly agreed with the statement that vocational teachers have adequate support for the development of new vocational curricula,with another 47 percent registering some agreement.[23] A majority of schools, or at least the administrators who responded to these questionnaires, therefore do not seem to think that there are any special resource problems for vocational teachers modifying their curricula.

When integration takes place, it is more likely to take place in certain subjects. Comprehensive high schools report that the most frequent integration takes place between business and math, business and English, and trade and industry and math,[24] all combinations in which there are relatively natural connections. Smaller fractions report integration between agriculture and science, and trade and industry and science.[25] The overall levels of integration are higher in vocational high schools, consistent with the generally higher levels of integration in Table 4.19, and the same combinations of academic and occupation areas are reported as having the most frequent collaboration.[26] Some of the highest levels of integration are reported in area vocational schools, especially between business and English (56 percent), business and math (50 percent), and T&I and math (74 percent), which is somewhat puzzling because such schools often do not have academic instructors and therefore have greater logistical problems with collaboration between academic and vocational instructors. These results may indicate that the majority of integration (certainly in area vocational schools) is taking place with vocational instructors on their own, rather than collaborating with their academic peers.

One of the most common approaches to integration has been the adoption of applied academics courses, particularly the commercially-available curricula called Applied Math, Applied Communications, and Principles of Technology, with some states and districts developing their own versions of applied academics. Because such off-the-shelf curricula can be incorporated into schools in a variety of ways, it is useful to ask how they have been used. In comprehensive high schools, 31 percent report that they are electives open to all students, 17 percent report that they are alternative means for students to get academic credit for graduation, and 15 percent claim that they are replacements for general track courses; in these forms, applied academics may simply be additions to the high school curriculum, rather than vehicles for integration. The majority of schools with such courses, 83 percent, report that they are taught by academically-certified teachers, while only 17 percent report team-teaching with academic and vocational instructors. In addition, 17 percent

report that they are part of an established sequence of academic and vocational courses and 15 percent claim that they are modified in ways to suit the local curriculum, suggesting more creative uses of such curriculum materials. The results are quite similar for vocational high schools and area vocational schools. These results confirm earlier observations[27] that applied academic courses can be used in a variety of ways, though in the majority of cases they are alternative electives taught by academic teachers, perhaps recommended for vocational students but not particularly part of the vocational curriculum.

It is somewhat more difficult to pinpoint the causes of variation in integration-related activities, however. As shown in Tables 4.18, 4.19, and 4.20, area vocational schools and area high schools report more activity than do comprehensive high schools. There is also a tendency for schools with positive perceptions of vocational education to report more activity related to integration; there is more such activity in schools agreeing that vocational students have clear ideas about their post-secondary options, that disagree with the view of vocational education as a "dumping ground" for weak students, that report academic and vocational teachers working together as teams, that report large and moderate increases in vocational enrollments, and that report "no problem" with their vocational instructors teaching academic subjects,[28] with staff development for vocational teachers, with maintaining vocational enrollments, with the image of vocational education in the business community or among parents and students, and with attracting qualified students. Each of these patterns is weak and somewhat erratic, and can be interpreted as demonstrating how widespread activities related to integration are. However, the direction of all this evidence, together with the greater activity in vocational high schools and area vocational schools, is consistent; efforts to integrate vocational and academic education are somewhat more likely in schools where vocational education is thriving, rather than being an antidote for weak vocational programs.

Consistently, high schools with higher proportions of minority students report that they engage more often in integration activities, as Tables 4.21, 4.22, and 4.23 indicate; this is true for comprehensive high schools, vocational high schools, and area vocational schools. This result indicates that the intention of the Perkins Amendments, to increase the extent of integration and to direct such activities to special-need students, insofar as minority students are more frequently defined as having special needs, is being realized.

Other district characteristics aside from the proportion of minority students have relatively weak effects, however. There is a slight tendency for larger high schools[29] to report more integration-related activities, but the relationship isn't especially strong. The relationship between the percent of students eligible for Chapter I (a measure of low income) and integration is erratic, except perhaps for area vocational schools where those with high

Table 4.21

Proportion of Comprehensive High Schools Reporting Integration Activity, by Percent Minority

Integration Activities	Percent Minority			
	Lowest Quartile	2nd quartile	3rd quartile	Highest quartile
Incorporate employability or generic work force skills into vocational curricula	70.5%	78.7%	76.9%	78.2%
Develop integrated curricula across vocational and academic courses	57.4	61.9	64.9	74.8
Develop sequence of integrated vocational and academic courses	54.7	52.5	61.6	67.4
Use applied academics or other integrated curricula from commercial vendors (e.g. Principles of Technology)	40.9	47.3	52.8	47.7
Use cross-curriculum materials (e.g., Writing Across the Curriculum)	47.7	49.9	57.4	60.9
Establish procedures for collaboration between academic and vocational teachers to develop integrated course offerings	55.9	64.0	63.7	68.7
Provide common planning periods for vocational and academic teachers to work on integration	12.6	10.2	15.1	19.1
Increase time available to teachers to work on integrated courses	25.6	37.0	30.3	31.6
Provide "tandem courses" where students take coordinated vocational and academic courses	26.9	29.8	37.6	51.8
Provide interdisciplinary courses combining occupational issues and academic disciplines (e.g., History of Technology, Society and Technology, The Literature of Work)	22.6	24.7	27.6	37.2
Other	1.0	1.8	0.8	1.2

N=1,092

Table 4.22

Proportion of Vocational High Schools Reporting Integration Activity, by Percent Minority

Integration Activities	Percent Minority			
	Lowest quartile	2nd quartile	3rd quartile	Highest quartile
Incorporate employability or generic work force skills into vocational curricula	87.7%	81.3%	90.5%	89.7%
Develop integrated curricula across vocational and academic courses	80.9	76.3	76.6	93.1
Develop sequence of integrated vocational and academic courses	55.0	78.9	80.9	78.6
Use applied academics or other integrated curricula from commercial vendors (e.g. Principles of Technology)	81.6	58.8	62.8	68.7
Use cross-curriculum materials (e.g., Writing Across the Curriculum)	47.3	59.5	77.4	80.5
Establish procedures for collaboration between academic and vocational teachers to develop integrated course offerings	59.2	69.6	75.5	90.0
Provide common planning periods for vocational and academic teachers to work on integration	27.8	19.5	32.1	28.6
Increase time available to teachers to work on integrated courses	32.8	44.7	31.2	47.0
Provide "tandem courses" where students take coordinated vocational and academic courses	33.9	64.1	38.4	47.8
Provide interdisciplinary courses combining occupational issues and academic disciplines (e.g., History of Technology, Society and Technology, The Literature of Work)	21.3	36.9	37.4	38.4
Other	4.0	0.0	0.0	1.2

N=216

Table 4.23

Percent of Area Vocational Schools Reporting Integration Activity, by Percent Minority

Integration Activities	Percent Minority			
	Lowest quartile	2nd quartile	3rd quartile	Highest quartile
Incorporate employability or generic work force skills into vocational curricula	87.0%	94.3%	97.8%	91.7%
Develop integrated curricula across vocational and academic courses	80.0	87.4	90.6	80.5
Develop sequence of integrated vocational and academic courses	73.5	81.6	70.7	74.8
Use applied academics or other integrated curricula from commercial vendors (e.g. Principles of Technology)	51.8	76.9	69.4	59.6
Use cross-curriculum materials (e.g., Writing Across the Curriculum)	31.4	49.3	60.6	46.9
Establish procedures for collaboration between academic and vocational teachers to develop integrated course offerings	74.2	75.7	79.5	85.6
Provide common planning periods for vocational and academic teachers to work on integration	8.3	13.7	22.2	11.5
Increase time available to teachers to work on integrated courses	44.8	53.5	42.6	59.2
Provide "tandem courses" where students take coordinated vocational and academic courses	44.7	51.7	48.7	46.3
Provide interdisciplinary courses combining occupational issues and academic disciplines (e.g., History of Technology, Society and Technology, The Literature of Work)	24.0	24.3	35.2	19.5
Other	1.3	0.6	1.1	0.9

N=427

proportions of low-income students tend to report *less* integration, contrary to the intent in the Perkins Amendments to direct federal resources to schools with high concentrations of "special needs" students.

Finally, the relation between the proportion of a school's students in college preparatory tracks[30] and integration activities is quite erratic in comprehensive high schools, suggesting that integration has not been confined only to those schools with many "non-college-bound" students. In vocational high schools, those with more "college bound" students tend to report less integration, while in area vocational schools the opposite appears to be true. One could argue that area vocational schools with non-college-bound students, and which have fewer academic offerings, have seen a greater need to integrate academic instruction for students who are unlikely to learn basic academic skills subsequently, while vocational high schools with more college-bound students *and* in which there are more academic teachers do not see the need to do so. However, this argument is based on thin evidence indeed; a more supportable statement is simply that there is little discernible relationship between the presence of college-bound programs and integration activities.

The Effects of District and State Policies

A further cause of school efforts is, not surprisingly, district policy. While 53 percent of all schools report no change in their district's support for efforts to integrate academic and vocational education, 38 percent report a moderate increase (including 47 percent of vocational high schools and 52 percent of area vocational schools), and 6 percent report a large increase (including 11 percent of vocational high schools and 15 percent of area vocational schools).[31] Very few schools, less than 4 percent, report decreases in district support. Furthermore, as one might expect, schools which report that their districts have provided increases in support also are undertaking more integration activities. Table 4.24 reports these results, for comprehensive high schools only; while the patterns are occasionally erratic, they generally confirm the positive relationship between district support and school activities related to the integration of academic and vocational education.

Similarly, it is quite clear that districts that have supported a coordinator for the integration of academic and vocational education have in fact prompted more integration activities in their schools. Table 4.25 indicates the fraction of comprehensive and vocational high schools reporting various types of activities, which confirms that schools in districts with such coordinators are more likely to be engaged in integration, particularly in schools that are part of vocational school districts rather than comprehensive high school districts. Indeed, these differences seem quite marked[32] in part because the resources in such district-level coordination are typically quite limited, especially in comprehensive districts. These results therefore suggest that district-level

Table 4.24

Proportion of Comprehensive High Schools Reporting Integration Activities by Changes in School District Support

Integration Activities	Assistance From School District for Integration				
	Large increase	Moderate increase	No change	Moderate decrease	Large decrease
Incorporate employability or generic work force skills into vocational curricula	82.4%	69.0%	57.0%	45.3%	63.9%
Develop integrated curricula across vocational and academic courses	43.6	45.8	31.1	33.6	9.5
Develop sequence of integrated vocational and academic courses	31.7	41.1	29.6	18.1	9.5
Use applied academics or other integrated curricula from commercial vendors (e.g. Principles of Technology)	34.3	30.4	17.4	32.6	4.4
Use cross-curriculum materials (e.g., Writing Across the Curriculum)	34.4	38.6	33.8	48.5	18.5
Establish procedures for collaboration between academic and vocational teachers to develop or implement integrated course offerings	42.5	36.2	26.0	12.8	13.3
Provide common planning periods for vocational and academic teachers to work on integration	17.3	16.8	11.9	28.6	4.4
Increase time available to teachers to work on integrated courses	11.1	13.5	7.8	16.6	4.4
Provide "tandem courses" where students take coordinated vocational and academic courses	24.5	17.5	15.3	14.5	5.1
Provide interdisciplinary courses combining occupational issues and academic disciplines (e.g., History of Technology, Society and Technology, The Literature of Work)	14.7	12.7	10.8	12.7	0.0

N=1,092

Table 4.25

Proportion of Comprehensive and Vocational High Schools Reporting Coordination Activities, by Presence or Absence of a District Coordinator

	Comprehensive High Schools District Coordinator		Vocational High Schools District Coordinator	
Cordination Activities	Yes	No	Yes	No
Incorporate employability or generic work force skills into vocational curricula	55.7%	54.9%	85.0%	72.4%
Develop integrated curricula across vocational and academic courses	31.5	32.1	59.0	37.2
Develop sequence of integrated vocational and academic courses	30.7	24.7	57.7	23.3
Use applied academics or other integrated curricula from commercial vendors (e.g. Principles of Technology)	24.1	21.4	59.4	33.5
Use cross-curriculum materials (e.g., Writing Across the Curriculum)	36.3	30.6	25.3	14.1
Establish procedures for collaboration between academic and vocational teachers to develop or implement integrated course offerings	26.3	26.5	55.6	29.4
Provide common planning periods for vocational and academic teachers to work on integration	19.6	19.5	35.4	13.1
Increase time available to teachers to work on integrated courses	12.4	8.3	44.3	14.0
Provide "tandem courses" where students take coordinated vocational and academic courses	19.2	11.2	39.7	12.3
Provide interdisciplinary courses combining occupational issues and academic disciplines (e.g., History of Technology, Society and Technology, The Literature of Work)	14.7	6.5	18.7	7.4
	N=1,092		N=216	

coordinators can influence school-level activities, and that where districts devote more resources to such coordination, as vocational districts do compared to comprehensive districts, the effects are somewhat more substantial.

We have previously seen (in Sections 2 and 3) that districts are more active in integration where states have been more supportive; and correlatively, schools are more active where their districts are more supportive. This is a top-down mechanism of change, operating, of course, with some slippage at each stage, where states influence districts and districts in turn influence schools. We can see the overall effects in Table 4.26, which describes the proportion of schools reporting various kinds of integration activities according to the level of state support reported by *district* officials. Particularly for schools in vocational districts, integration is more common (for virtually every type of activity) in states reported as providing "very good support" rather than "little or no support." The patterns are somewhat more erratic and weaker for schools in comprehensive districts, but here too certain activities, especially the use of applied academics curricula, the tendency to establish procedures for collaboration between academic and vocational teachers, and the provision of common planning periods, are more frequent in more supportive states.

In conclusion:

- At the school level, support for integrating academic and vocational education is widespread and increasing, though it is higher in vocational high schools and area vocational schools than in comprehensive high schools.

- There does not appear to be much collaboration between academic and vocational teachers up to this point. Even among those claiming that collaboration does take place, most acknowledge that there is no regular schedule, and others report very small amounts of time dedicated to collaboration.

- Integration takes place most frequently with certain combinations of subjects: business with math and English, trade and industry with math, agriculture with science.

- There is a tendency for there to be more integration in schools where there is strong support for vocational education; integration appears not to be a way to bolster vocational programs where they are weak.

- Integration is more common in schools with higher proportions of minority students.

Table 4.26

Proportion of High Schools Reporting Integration Activities, by Level of State Support for Integration

Integration Activities	Comprehensive High Schools — State Support			Vocational High Schools — State Support		
	Very Good	Adequate	Little or None	Very Good	Adequate	Little or None
Incorporate employability or generic work force skills into vocational curricula	57.9%	49.3%	68.9%	81.2%	78.0%	69.2%
Develop integrated curricula across vocational and academic courses	36.7	31.2	31.1	52.8	42.1	39.1
Develop sequence of integrated vocational and academic courses	28.2	25.8	27.7	38.7	35.0	34.2
Use applied academics or other integrated curricula from commercial vendors (e.g. Principles of Technology)	32.2	22.6	16.1	49.2	43.8	31.7
Use cross-curriculum materials (e.g., Writing Across the Curriculum)	31.3	28.1	40.2	27.1	16.8	14.1
Establish procedures for collaboration between academic and vocational teachers to develop or implement integrated course offerings	31.3	26.5	22.1	41.3	42.4	31.1
Provide common planning periods for vocational and academic teachers to work on integration	24.7	19.6	15.7	24.1	24.3	13.3
Increase time available to teachers to work on integrated courses	10.3	10.4	7.7	26.2	30.6	12.7
Provide "tandem courses" where students take coordinated vocational and academic courses	13.8	15.8	10.6	33.8	23.0	11.2
Provide interdisciplinary courses combining occupational issues and academic disciplines (e.g., History of Technology, Society and Technology, The Literature of Work)	9.8	9.4	5.8	12.2	10.7	10.2
	N=1,092			N=216		

- Both district support for integration and the appointment of a district coordinator for integration increase the frequency of integration activities at the school level.

- State support for integration enhances school-level activities, through a "top down" mechanism where state support increases district support, and district support in turn causes high schools to increase their integration efforts.

5. STATE POLICIES: POSTSECONDARY VOCATIONAL EDUCATION

The Perkins Amendments apply uniformly to both secondary and postsecondary education, and therefore the requirement to use federal funds to integrate academic and vocational education applies equally to postsecondary institutions, community colleges and technical institutes, as it does to secondary institutions. However, in general the conception of integration has been less well-developed at the postsecondary level, and awareness of the Perkins requirements related to integration is much lower.[33]

The findings from these surveys corroborate this general observation. At the state level, states have begun to formulate various kinds of policies related to integration, as the results in Table 4.27 indicate; and there is a definite trend in states becoming more active over time, since the fraction of states planning to undertake integration activities in 1992-93 is uniformly higher than the fraction who had already done so at the time of the survey. However, the proportion undertaking any particular activity is substantially lower than for *secondary* education, as described in Table 4.1 above. For example, 77 percent of states had undertaken pilot projects at the secondary level by 1991-92, compared to 40 percent at the postsecondary level; 80 percent had provided technical assistance at the secondary level, compared to 50 percent at the postsecondary level.

As is true at the secondary level, the provision of materials from vendors is one of the most common activities at the postsecondary level, as is providing technical assistance to administrators. In addition, a majority of states, 56 percent, report that they will provide in-service training for occupational faculty in 1992-93. No other activities are planned by a majority of states, indicating that community colleges and technical institutes in most states are pretty much on their own when it comes to integration.

State activities related to "all aspects of the industry" are similarly underdeveloped at the postsecondary level. Very few states had undertaken any such activities by 1991-92, as Table 4.28 clarifies; at most, six states (12 percent) reported adopting mandatory guidelines to ensure that "all aspects of

Table 4.27

Proportion of Directors of Postsecondary Vocational Education Reporting Integration Activities

Integration Activities	Started before 1991-92	Started or continued in 1991-92	Planned or continuing in 1992-93
Adopt a definition of integration	14.6	31.3	47.9
Provide mandatory curriculum for frameworks or guidelines for integration of occupational/technical and general education	18.8	16.7	25.0
Provide recommended curriculum frameworks or guidelines for integration of occupational/technical and general education	20.8	29.2	47.9
Provide guidelines on the development of coherent sequences of courses	25.0	33.3	54.2
Combine occupational/technical curriculum frameworks with those of general or transfer departments at state level	27.1	27.1	35.4
Provide in-service training for occupational/technical faculty	20.8	33.3	56.3
Provide in-service training for general/or transfer faculty	8.3	16.7	43.8
Provide technical assistance for administrators	27.1	50.0	66.7
Help make available applied academic or other integrated course materials from commercial vendors	52.1	56.3	62.5
Develop or disseminate state-developed integrated curricula	20.8	20.8	33.3
Promote participation in a regional consortium that supports integration	37.5	47.9	56.3
Fund pilot projects that integrate occupational/ technical and general education	27.1	39.6	47.9
Other	10.4	8.3	8.3

N=48

Table 4.28

Proportion of State Directors of Postsecondary Vocational Education Reporting Activities Related to "All Aspects of the Industry"

	Done in 1991-92	Planned for 1992-93
Adopt a definition of "all aspects of the industry"	6.3	35.4
Provide a mandatory curriculum framworks or guidelines to ensure that "all aspects of the industry" are addressed in occupational/technical courses	12.5	29.2
Provide a recommended curriculum framworks or guidelines to ensure that "all aspects of the industry" are addressed in occupational/ technical courses	14.6	41.7
Provide in-service training for occupational/ technical faculty on "all aspects of the industry"	6.3	39.6
Provide in-service training for postsecondary guidance counselors on "all aspects of the industry"	4.2	41.7
Other	66.7	100.0

N=48

the industry" are addressed in occupational courses.[34] While a larger number of states reported that they would begin various new activities in 1992-93, these plans may not materialize in a number of states. A reasonable conclusion from these results is that only a minority of states will undertake any initiatives related to "all aspects of the industry" at the postsecondary level.

As in the case of secondary education, postsecondary administrators reported that there is considerable support for integration, but also that support is much stronger among vocational officials than among academic officials. Of all states, 80 percent reported that occupational officials are supportive of integration, while four (8 percent) are neutral and only 1 state opposed; 2 states reported that state occupational administrators are generally uninformed. Among academic officials, however, only 46 percent of states reported them to be supportive, while 25 percent are neutral and 20 percent are uninformed; only one state reported general opposition from academic officials. There is, then, little active hostility toward the idea of integration, from any quarter; however, a lack of information and neutrality are quite common among academic administrators, and more so at the postsecondary level than among secondary officials.

A further question is whether the availability of Perkins funds has caused states to be more active in developing activities related to integration. In this case, the responses of states suggest that increasing amounts of Perkins funds in fact have spurred states to be more active in promoting integration. Table 4.29 presents information differentiated by the proportion of state postsecondary vocational resources that come from Perkins funds, where it is clear that states with higher proportions of Perkins funding are more likely to engage in state-level activities related to integration. Table 4.30 presents similar information for states where varying fractions of Perkins funds are directed to postsecondary rather than secondary institutions; states where postsecondary institutions receive a larger fraction of Perkins funds are more likely to institute activities related to integration. To be sure, some of these differences are small, and some patterns are erratic; but overall they confirm the expected relationship between Perkins funds and state activities about integration.

Overall, we can conclude the following:

- While there is increasing state interest in integration at the postsecondary level, such activities are less common than at the secondary level.

- States with high proportions of their vocational resources coming from Perkins funds, and those with a higher fraction of Perkins funds allocated to the postsecondary level, are more likely to engage in integration activities. This suggests that federal

Table 4.29

Effects of Proportion of Vocational Revenues From Perkins on State Integration Activities

	Lowest quartile	2nd quartile	3rd quartile	Highest quartile
Adopt a definition of integration	16.7	75.0	83.3	71.4
Provide mandatory curriculum for frameworks or guidelines for integration of occupational/ echnical and general education	50.0	25.0	50.0	28.6
Provide recommended curriculum frameworks or guidelines for integration of occupational/technical and general education	33.3	62.5	66.7	71.4
Provide guidelines on the development of coherent sequences of courses	50.0	75.0	66.7	57.1
Combine occupational/technical curriculum frameworks with those of general or transfer departments at state level	66.7	37.5	66.7	42.9
Provide in-service training for occupational/technical faculty	50.0	62.5	50.0	71.4
Provide in-service training for general/or transfer faculty	0.0	0.0	16.7	28.6
Provide technical assistance for administrators	50.0	87.5	33.3	100.0
Help make available applied academic or other integrated course materials from commercial vendors	50.0	75.0	83.3	57.1
Develop or disseminate state-developed integrated curricula	66.7	0.0	50.0	28.6
Promote participation in a regional consortium that supports integration	33.3	62.5	66.7	57.1
Fund pilot projects that integrate occupational/technical and general education	16.7	62.5	33.3	57.1
Other	0.0	25.0	16.7	0.0

N=48

Table 4.30

Effects of Postsecondary Share of Perkins Funds on Integration Activities

Integration Activities	Lowest quartile	2nd quartile	3rd quartile	Highest quartile
Adopt a definition of integration	36.4	54.5	54.5	72.7
Provide mandatory curriculum for frameworks or guidelines for integration of occupational/technical and general education	9.1	45.5	27.3	27.3
Provide recommended curriculum frameworks or guidelines for integration of occupational/technical and general education	36.4	45.5	54.5	63.6
Provide guidelines on the development of coherent sequences of courses	36.4	63.6	63.6	63.6
Combine occupational/technical curriculum frameworks with those of general or transfer departments at state level	18.2	27.3	54.5	54.5
Provide in-service training for occupational/technical faculty	63.6	63.6	54.5	54.5
Provide in-service training for general/or transfer faculty	0.0	9.1	0.0	18.2
Provide technical assistance for administrators	54.5	72.7	81.8	63.6
Help make available applied academic or other integrated course materials from commercial vendors	45.5	63.6	90.9	63.6
Develop or disseminate state-developed integrated curricula	36.4	36.4	18.2	54.5
Promote participation in a regional consortium that supports integration	27.3	72.7	81.8	54.5
Fund pilot projects that integrate occupational/technical and general education	18.2	63.6	63.6	63.6
Other	9.1	18.2	0.0	18.2

N=48

resources are important in stimulating postsecondary integration efforts.

6. POSTSECONDARY INSTITUTIONS

Although the requirements of the Carl Perkins Amendments related to the integration of academic and vocational education apply equally to postsecondary institutions, there has been much less activity related to integration in community colleges and technical institutes compared to high schools.[35] Furthermore, while the notion of integration at the high school level has a long history behind it, the idea is still quite unfamiliar at the postsecondary level, except possibly in the form of general education, which provides some academic instruction to all students including those in occupational programs. It would not be surprising, therefore, to find relatively little integration taking place in postsecondary institutions, or to find them only beginning to plan for integration.

However, it is clear that there have been changes in postsecondary curricula consistent with greater integration. Of all postsecondary institutions, 45 percent report that they have added applied academic courses over the past five years (and only 4 percent report that they have reduced such courses); these are courses, like technical math, or technical writing, which take academic subject matter and modify it for occupational areas. Another 61 percent report that they have added general occupational skills training to the curriculum. Finally, 64 percent report increases in tech-prep or 2+2 programs, an approach which can (but often does not) involve integration within the postsecondary curriculum.

Table 4.31 reports the frequency of more specific types of integration activities. Similar to the results for secondary districts and schools, the results indicate that there is increasing activity, with many more institutions planning integration activities for the future than started them before 1991. Consistent with earlier findings,[36] the most frequent integration activities are the establishment of general education requirements for occupational students, the development of applied academics courses (like applied math and applied science courses for particular occupational areas), and the use of cross-curriculum materials, of which Writing Across the Curriculum is the best-known. In addition, the use of Perkins funds to support remedial education for occupational students is virtually universal, since it is reported by over 90 percent of community colleges and technical institutions (in row 10 of Table 4.31). These efforts are only rarely integrated in any meaningful way; usually, this refers to the practice of offering remedial courses or labs concurrently with occupational courses.

Table 4.31

Proportion of Postsecondary Institutions Reporting Integration Activities

Integration Activities	Started before 1991-92	Started or continuing in 1991-92	Planned or continuing in 1992-93
Hold planning meetings to develop policies or procedures for implementing integrated programs	56.8%	71.9%	80.6%
Establish general education competencies for occupational/technical students	71.2	79.3	86.8
Use applied academics or other integrated courses from commercial vendors (e.g., CORD, AIT)	14.2	21.7	36.7
Develop applied academics courses (such as Technical Math, Business-English, etc.)	68.3	69.4	77.4
Use cross-curriciulum materials (e.g., Writing Across the Curriculum)	50.3	56.2	66.8
Provide in-service training for occupational/technical staff on integration	30.4	42.7	63.6
Provide in-service training for general/transfer education staff on integration	22.6	32.9	56.0
Provide "tandem courses", where students take coordinated general education and occupational/technical courses	38.5	40.7	51.2
Provide interdisciplinary courses combining occupational issues and academic disciplines (e.g., History of Technology, Ethics in Business, The Literature of Work)	27.8	31.9	44.9
Support remedial/developmental education, learning labs, tutoring, and other steps to increase basic skills of occupational/technical students	91.3	90.6	92.2
Other efforts to integrate occupatonal/technical and general education	57.9	82.5	90.9

N=993

It is clear that integration is more common in certain occupational areas. Based on the results in Table 4.32, integration is most common in business and management and in office support occupations,[37] with their natural links to both English and simple math; in health, with its links to biology and chemistry; and in computers and data processing, with their relation to math. Integration activities are also relatively high for technical areas in communications, engineering, and science, probably because of math requirements; and they are surprisingly high in trade and industrial areas as well, some of which (e.g., machining) use math. However, integration is much less common in agriculture, in marketing and distribution, and in protective services.

The presence of integrated curricula does not seem to vary by type of credential: 91 percent of institutions reported some integrated curricula in Associate-level programs, while 89 percent reported integrated curricula in all occupational programs. Another 85 percent reported integrated curricula in all programs, whether occupational or transfer-oriented, and 84 percent reported integrated curricula for all students in remedial or developmental programs. However, these high responses probably refer to the existence of general education requirements, which are ubiquitous for all types of students, and to the presence of academic content in developmental courses, rather than to the offering of truly integrated curricula since integrated courses for transfer students are quite rare (even in general education requirements), as are integrated developmental courses.

Of all institutions, two-thirds (68 percent) reported that occupational and academic faculty work together to develop or implement integrated courses. However, in the majority of these institutions, 75 percent, there is no regular meeting of faculty for integration; and only 5 percent report that faculty meet two or more hours per week on planning. These results give the distinct impression that faculty participation in developing integrated curricula is a low-intensity and haphazard activity. When faculty do collaborate, they are most likely to review general education requirements (54 percent), to incorporate academic materials into existing occupational courses (44 percent), to develop new applied academic courses (35 percent) or develop applied academic materials for incorporation into existing general education courses (35 percent), or to develop cross-curriculum efforts like Writing Across the Curriculum. They are much less likely to develop tandem courses (23 percent) or team teaching (18 percent).

Postsecondary institutions also report using their Perkins funds in ways consistent with integration: 93 percent report using such resources for staff development, 81 percent for release time for faculty, 94 percent for purchasing curriculum materials, 91 percent for the modification of existing curriculum materials, 91 percent for curriculum development, 93 percent for purchases

Table 4.32

Proportion of Institutions Reporting Activities With Collaboration From Academic Instructors, by Occupational Area

	All activities	Most activities	Few activities	One activity	No activities
Agriculture	9.1	11.5	8.4	1.5	37.2
Business and Management	24.6	34.3	15.3	2.5	7.1
Office Support Occupations	27.9	37.9	14.9	2.6	4.0
Marketing and Distribution	16.8	23.5	13.8	2.4	16.8
Health	27.1	36.2	15.0	1.9	7.2
Occupational Home economics	9.7	13.1	9.8	1.1	33.0
Protective Services	12.1	18.1	12.7	2.3	25.7
Computers/Data Processing	25.9	34.1	16.7	3.1	6.3
Communications, Engineering and Science	22.0	30.3	14.6	1.1	11.4
Trade and Industrial	24.7	33.6	16.2	2.2	9.0

N=993

related to learning labs and other remedial programs,[38] and 83 percent for the support of curriculum coordinators or others responsible for the integration of academic and vocational education. Thus the major activities which take place when educational institutions try to integrate academic and vocational education, staff development, curriculum development, the purchase of new curriculum materials, release time for teachers, and the like, have been supported by Perkins funds.

Postsecondary institutions also report that the emphasis on integrating academic and vocational education in the 1990 Perkins Amendments has generally been positive: 25 percent report that the effect on occupational programs has been very positive and 35 percent that it has been "slightly positive," while 30 percent report no change as a result and only 5 percent report negative effects.

When we examine the potential causes of integration activities, there are only a few revealing results. Large institutions are more likely to engage in cross-curricular efforts (like Writing Across the Curriculum[39]) compared to small institutions, and they are also more likely to support interdisciplinary courses combining occupational issues and academic disciplines and remedial efforts.[40] Levels of funding per student seem to make little difference except that those with more resources per student are slightly more likely to support tandem courses and remediation.[41] There is some evidence, summarized in Table 4.33, that Perkins funds per vocational student influence the extent of integration: institutions with more Perkins resources are somewhat more likely to report different integration activities, though the differences in most cases are not especially striking. Indeed, the usual pattern is in fact reversed in the case of Writing Across the Curriculum, an innovation which predates the Perkins Amendments, and which does not reach many occupational students, and in the case of interdisciplinary courses, many of which have been supported by resources from the National Endowment for the Humanities and the Fund for the Improvement of Postsecondary Education. This suggests that Perkins funds may have operated to increase forms of integration which have no other resources to support them.

However, there is no evidence that the proportion of students who are Pell recipients, a measure of low-income students,[42] or the proportion of minority students affects the level of various integration activities. Cross-curricular efforts are somewhat more common in institutions with low proportions of Pell students, and tandem courses slightly more common in institutions with high proportions of Pell students,[43] but these appear to be random findings which do not suggest any particular patterns. There is not, therefore, any distinct tendency to develop integrated curricula for special needs students (including low-income and minority students), as one could infer that the Perkins Amendments intended.

Table 4.33

Proportion of Postsecondary Institutions Reporting Integration Activities, by Perkins Funds Per Vocational Student

Integration Activities	Perkins Funds Per Vocational Student			
	Lowest quartile	2nd quartile	3rd quartile	Highest quartile
Hold planning meetings to develop policies or procedures for implementing integrated programs	50.8	53.2	55.6	58.3
Establish general education competencies for occupational/technical students	65.8	72.3	77.5	70.1
Use applied academics or other integrated courses from commercial vendors (e.g., CORD, AIT)	7.5	11.2	19.3	16.6
Develop applied academics courses (such as Technical Math, Business-English, etc.)	59.9	63.3	67.9	64.2
Use cross-curriculum materials (e.g., Writing Across the Curriculum)	50.8	56.9	49.2	40.1
Provide in-service training for occupational/technical staff on integration	21.4	29.8	35.8	31.6
Provide in-service training for general/transfer education staff on integration	19.3	25.0	28.3	25.7
Provide "tandem courses", where students take coordinated general education and occupational/technical courses	32.6	35.1	41.2	44.9
Provide interdisciplinary courses combining occupational issues and academic disciplines (e.g., History of Technology, Ethics in Business, The Literature of Work)	28.9	31.4	28.3	18.7
Support remedial/developmental education, learning labs, tutoring, and other steps to increase basic skills of occupational/technical students	84.0	89.9	94.7	94.1
Other efforts to integrate occupatonal/technical and general education	7.5	8.5	7.0	7.5

N=993

Effects of State Policy

An interesting question is whether state-level policies toward integration and Perkins resources have influenced local efforts to integrate at the postsecondary level. Table 4.34 distinguishes between states which have undertaken any of the integration activities described in Table 4.31 and those reporting no state-level integration initiatives. As expected, institutions in the former states are more likely to report undertaking their own integration efforts, while those in the latter states are less likely to be integrating in various ways. The differences in some cases are rather small, but they are relatively consistent. The only exceptions to these patterns come in the cases of in-service activities for academic faculty, of tandem courses, and, most strongly of all, of interdisciplinary courses, likely to be funded from other sources.

Consistent with these results, Table 4.35 describes the proportion of postsecondary institutions reporting various types of integration activities, varying by the proportion of Perkins funds allocated to postsecondary (rather than secondary) education, a measure of both resources and of the postsecondary emphasis in a state's vocational program. Integration activities are slightly more frequent in states where a high proportion of Perkins resources are allocated to postsecondary institutions, as one might expect, though again the differences are sometimes slight. The only exception is, once again, the tendency to develop interdisciplinary courses, a change which tends to be linked with funding sources other than those available for vocational education.

In conclusion, these results suggest the following conclusions about the integration of academic and occupational education in postsecondary institutions:

- There is increasing interest in integration, but the level of activity is still low, especially compared to that in secondary schools.
- There appears to be very little regular collaboration of academic and occupational faculty.
- Large institutions, and those with higher spending per student, are more likely to engage in certain integration activities.
- Perkins funds are important in stimulating integration.
- Institutions in states without any integration initiatives report fewer integration activities than institutions in more active states.

Table 4.34

Proportion of Postsecondary Institutions Reporting Integration Activities, by Presence or Absence of State Integration Activities

Integration Activities	Any state integration activity	No state integration activity
Hold planning meetings to develop policies or procedures for implementing integrated programs	83.4	68.4
Establish general education competencies for occupational/technical students	89.6	78.9
Use applied academics or other integrated courses from commercial vendors (e.g., CORD, AIT)	36.1	26.3
Develop applied academics courses (such as Technical Math, Business-English, etc.)	82.7	78.9
Use cross-curriciulum materials (e.g., Writing Across the Curriculum)	70.8	68.4
Provide in-service training for occupational/technical staff on integration	65.7	52.6
Provide in-service training for general/transfer education staff on integration	22.1	36.8
Provide "tandem courses", where students take coordinated general education and occupational/technical courses	52.6	57.9
Provide interdisciplinary courses combining occupational issues and academic disciplines (e.g., History of Technology, Ethics in Business, The Literature of Work)	45.7	68.4
Support remedial/developmental education, learning labs, tutoring, and other steps to increase basic skills of occupational/technical students	94.4	84.2
Other efforts to integrate occupatonal/technical and general education	11.4	10.5

N=993

Table 4.35

Proportion of Postsecondary Institutions Reporting Integration Activities, by Fraction of Perkins Funds Allocated to Postsecondary Institutions

Integration Activities	Fraction of Perkin Funds to Postsecondary Institutions			
	Lowest quartile	2nd quartile	3rd quartile	Highest quartile
Hold planning meetings to develop policies or procedures for implementing integrated programs	77.7	79.5	86.4	86.4
Establish general education competencies for occupational/technical students	86.0	89.1	94.2	88.4
Use applied academics or other integrated courses from commercial vendors (e.g., CORD, AIT)	30.6	34.8	40.3	39.1
Develop applied academics courses (such as Technical Math, Business-English, etc.)	77.7	80.9	86.4	83.4
Use cross-curriciulum materials (e.g., Writing Across the Curriculum)	72.7	65.9	71.8	72.2
Provide in-service training for occupational/technical staff on integration	55.4	63.5	71.8	68.2
Provide in-service training for general/transfer education staff on integration	23.1	21.8	24.3	21.9
Provide "tandem courses", where students take coordinated general education and occupational/technical courses	46.3	49.8	56.3	56.3
Provide interdisciplinary courses combining occupational issues and academic disciplines (e.g., History of Technology, Ethics in Business, The Literature of Work)	52.9	47.1	39.3	48.3
Support remedial/developmental education, learning labs, tutoring, and other steps to increase basic skills of occupational/technical students	89.3	96.6	96.1	93.0
Other efforts to integrate occupatonal/technical and general education	7.4	11.3	9.7	13.9

N=993

7. CONCLUSIONS AND RECOMMENDATIONS FOR FURTHER STUDY

A number of conclusions emerge across all the results in this report:

- The level of activity related to the integration of academic and vocational education is relatively high at the secondary level, and is clearly increasing since states, school districts, and local educational institutions report that they did more in 1991-92 than in prior years, and plan to do more in the future. Vocational administrators are generally quite supportive of integration, and of the changes in the Perkins Amendments related to integration. Academic administrators are less supportive, but largely because of ignorance or indifference rather than hostility.

- The level of activity related to integration is much less at the postsecondary level, but here too there seems to be increasing interest.

- Integration seems to be more frequent in districts and schools where vocational education is in relatively good shape, and in vocational school districts (compared to comprehensive districts) and in vocational high schools and area vocational schools (compared to comprehensive high schools). Integration does not appear to be used to shore up weak vocational programs.

- While some results are erratic, there is evidence that integration is more frequent in large districts and large institutions, in those with more resources, in those with more vocational students, with more low-income students, and with more minority students. Thus integration efforts seem to have been targeted in large, urban districts with higher proportions of special needs students, as the Perkins Amendments intended.

- There is some evidence of the effectiveness of federal funding in stimulating integration: Greater funding from Perkins sources leads to more integration at both the district and the school level, for secondary education, and at the institution level, for community colleges and technical institutes.

- While many integration activities in the past have been local in their origins, there is some evidence of "top-down" implementation; states with more integration initiatives tend to increase district initiatives, and district initiatives increase the proportion of high schools reporting integration activities. A

similar pattern is evident in postsecondary institutions as well, though the frequency of integration is lower.

From what we can gather from questionnaire data, then, there is evidence of the success of the Perkins Amendments and their requirements that schools use federal resources to support the integration of academic and vocational education. This is particularly the case since these results report developments as of spring 1992, very shortly after the enactment of the Amendments.

However, what remains unclear from these results is what changes are taking place in classrooms, since we fear that the responses reported in this report may be exaggerated. In addition, it remains unclear whether changes are being institutionalized in ways that make them independent of federal funding and federal requirements. These are questions, of course, that cannot be answered through questionnaires; they require case studies of specific schools, observations of integrated classrooms, and longitudinal studies to examine the durability of changes. The case studies being conducted by NAVE should help interpret the survey results in this report.

It is also difficult to judge the quality and the thoroughness of integration activities undertaken so far without case studies. For example, in these survey results the high reliance on applied academic curricula provided by CORD and AIT is disquieting since these curricula have not been properly evaluated, and since they represent approaches to integration which usually involve no collaboration among teachers and no change in the structure of high school opportunities.

In addition, our finding that "top down" policies appear to be working, that is, that the scope of state initiatives influence district activities, and that district policies influence school-level integration, is a tantalizing result, but potentially disquieting because of evidence from other reforms that "top-down" efforts may be impermanent. Another important question for subsequent study would be to examine precisely how states have come to influence districts and districts their schools, and furthermore to see whether these activities have taken place in ways that generate enough real support from the local level that changes are likely to be enduring.

Finally, the difference between the results at the secondary level and those for community colleges and technical institutes, while not surprising, indicate once again the extent to which federal legislation in the arena of vocational education has focused on, and been successful for secondary rather than postsecondary vocational education. One conclusion from these results is that subsequent revisions of the Carl Perkins Act should concentrate more specifically on the distinctive vocational issues at the postsecondary level, in order to have a greater influence on postsecondary vocational education, rather than presuming that one act can encompass two such different types of education.[44]

ENDNOTES

1 The survey does not attempt to assess student-level effects associated with integration, however. Few evaluations of integration have been conducted so far; see the companion literature review by Stasz, Kaganoff, and Eden (1993). (Stasz, C., Kaganoff, T., and Eden, R. (1993). *Integrating Academic and Vocational Education: A Review of the Literature.* Santa Monica: The RAND Corporation, for the National Assessment of Vocational Education, U.S. Department of Education.)

2 Grubb, W. N., Davis, G., Lum, J., Plihal, J., and Morgaine, C. (1991, July), *"The Cunning Hand, The Cultured Mind" Models for Integrating Vocational and Academic Education.* Berkeley: National Center for Research in Vocational Education.

3 Bodilly, S., Ramsey, K., Stasz, C., and Eden R.A. (1993), *Integrating Academic and Vocational Education: Lessons from Eight Early Innovators.* Berkeley: National Center for Research in Vocational Education.

4 Stasz, C., & Grubb, W.N. (1991), *Integrating Academic and Vocational Education: Guidelines for Assessing a Fuzzy Reform.* Berkeley: National Center for Research in Vocational Education for the National Assessment of Vocational Education, U.S. Department of Education.

5 Bodilly, et al. (1993).

6 Grubb, et al., (1991, July).

7 In an early survey, Losh, Border, and Bishop found these applied academics curricula to be the dominant approach to integration (Losh, C., Border, B., and Bishop, D. (1988). *Integrating Vocational-Technical Education and Basic Academic Skills: A Status Report.)* A more recent survey of the 50 states confirmed this pattern (McDonnell, L., and Zellman, G., (1992), *Education and Training for Work in the Fifty States.* Berkeley: National Center for Research in Vocational Education.), as did the fieldwork for Grubb et al. (Grubb, W. N., Davis, G., Lum, J., Plihal, J., and Morgaine, C. (1991, July). *"The Cunning Hand, The Cultured Mind" Models for Integrating Vocational and Academic Education.* Berkeley: National Center for Research in Vocational Education.

8 While the relation of "all aspects" to integration is unclear, schools that integrate academic and vocational education, particularly around clusters of occupations or around industries, can readily incorporate information about "all aspects" of the occupation or industry. (Section 235(c)(2)(L)).

9 Grubb, et al., (1991, July).

10 Benson, C. (1991), *"The Current State of Occupational and Technical Training: The Need for Integration and High Quality Programs."* Paper prepared for the Council of Chief State School Officers.

11 Bodily, et al., (1993).

12 This conclusion is based on statistics describing integration activities, as in Table A-1, for states with varying levels of Perkins funds as a fraction of total vocational resources.

13 Of the quartile of states with the most robust vocational programs, 23 percent report such requirements, compared to 57 percent of the quartile with vocational programs in the greatest decline.

14 Two examples should suffice: 72 percent of districts claim that they will institute guidance and counseling activities to promote integration; yet in meeting after meeting of teachers and administrators, educators have complained to us about the absence of career-oriented counseling and about the antipathy of traditional counselors to anything related to vocational education, making us suspicious that these numbers are inflated. Similarly, 46 percent of districts claimed that they would develop occupationally-oriented clusters or career paths in 1992-93; but based on requests for technical assistance to NCRVE from many states, most districts are only in the preliminary planning stages, not the initial stages of development.

15 More precisely, 26 percent of districts reported that state initiatives were moderately instrumental, with 23 percent reporting them largely instrumental; corresponding figures for local initiatives were 25 percent and 21 percent.

16 In addition, 36 percent reported no change as a result of other reforms.

17 Very few districts report reducing such efforts -- only 1 percent, 1 percent, and 3 percent respectively -- though many report no change.

18 Other claims which seem exaggerated include the report that 28 percent have instituted co-op and work experience programs, that 31 percent have started tech prep programs, that 24 percent have expanded job placement activities, that 61 percent have added state-of-the-art equipment, and that 45 percent have introduced vocational assessments.

19 One might expect these districts to have high proportions of minority students, and to be creating magnets for the purposes of racial integration; alternatively, districts with high proportions of low-income students might have limited resources, though Table 4.6 does not indicate that low-spending districts are less likely to be planning magnets.

20 It seems unlikely that these results are an artifact of the way in which the data were collected. The questions about state support are questions 22 and 23 on the school district questionnaire (version B), while the crucial question about integration efforts is question 37, considerably further along in the questionnaire. Thus it seems reasonable that the responses to these two kinds of questions are independent.

21 Consistent with this hypothesis, the pattern of integration activities for varying proportions of Chapter I (low income) students is erratic for vocational school districts, contrary to the pattern in Table B-5 for comprehensive districts.

22 Our experience visiting high schools and presenting workshops to secondary teachers and administrators suggests that the lack of joint planning time has been a constant frustration to those attempting integration, and that there has been little progress in creating common planning time except perhaps in Academies. See also Bodilly, S., Ramsey, K., Stasz, C., and Eden R.A. (1993), *Integrating Academic and Vocational Education: Lessons from Eight Early Innovators*. Berkeley: National Center for Research in Vocational Education.

23 This is one of the questions asked school administrators about current issues in vocational education, in question 56. We interpret some responses to these questions as wishful thinking; for example, 66 percent agree that "guidance and counseling staff in this school do a good job of informing vocational students about job opportunities and requirements", in a period when

our fieldwork has revealed that resources in counseling and guidance have been severely curtailed and when most counselors do very little career-oriented counseling. In addition, 56 percent of schools report that "vocational and academic teachers in this school work together as a team," despite other evidence of how distant vocational and academic teachers are from each other (Little, J. W. (1992), *Two Worlds: Vocational and Academic Teachers in Comprehensive High Schools*. Berkeley: National Center for Research in Vocational Education) and of how the gulf impedes integration.

[24] The fraction of schools reporting collaboration in these three combinations are 34 percent, 40 percent, and 32 percent, respectively.

[25] The proportions are 23 percent, 20 percent, and 18 percent. One surprise is that collaboration between health and science is low, 14 percent, but this may because health occupations at the high school level often involve very low-level occupations.

[26] The proportion reporting collaboration are 46 percent for agriculture and science, 45 percent for business and math, 55 percent for business and English, 44 percent for T&I and math, and 36 percent for T&I and English.

[27] Grubb, et al., (1991, July).

[28] There is one exception here, however: vocational high schools reporting that getting vocational instructors to teach academic subjects to be a problem are *more* likely to report integration activities of various kinds. This is a relatively natural response, in a type of school which already incorporates academic teachers.

[29] Size is measured by 11th plus 12th grade enrollments.

[30] These are measured by responses to a question about the number of students in programs "that prepare students for entry into a four-year college."

[31] A companion question about district support for "all aspects of the industry" reveals much more limited support: 70 percent report no change, 23 percent report a modest increase, and 3 percent a large increase.

[32] Because the information about district-level coordination and school-level integration come from independent questionnaires, there is no obvious way in which these patterns could be spurious, for example, due to the same individual responding to both questions.

[33] On different integration practices at the postsecondary level, see Grubb, W.N., and Kraskouskas, E., (1992), *A Time to Every Purpose: Integrating Academic and Occupational Education in Community Colleges and Technical Institutes*. Berkeley: National Center for Research in Vocational Education. The statement about low postsecondary awareness of the Perkins integration requirements is based on informal contacts with community colleges asking NCRVE for technical assistance.

[34] It is hard to know how to interpret this finding, since the conception of "all aspects of the industry" is still quite unfamiliar to secondary vocational administrators and instructors, and is even less familiar at the post-secondary level. However, many postsecondary occupational programs includes introductory courses like "Introduction to Business" or "Introduction to Health Careers," which certainly have some elements of "all aspects of the industry"; it may be that the 6 states claiming to have instituted mandatory curricula are referring to such introductory courses.

[35] Grubb, W.N., & Kraskouskas, E. (1992). *A Time to Every Purpose: Integrating Academic and Occupational Education in Community Colleges and Technical Institutes*. Berkeley: National Center for Research in Vocational Education.

[36] Ibid.

[37] In most community colleges, there is little difference between business and office support: many business programs in fact teach word processing, spreadsheet programs, data base management, and other specific skills which would be used by office support personnel.

[38] The use of Perkins funds to support remedial education for occupational students is a widespread activity. Whether or not it constitutes integration of academic and occupational content is a difficult issue since in most cases remedial programs are not well integrated with the content of occupational courses (see Grubb, W.N. and Kraskouskas, E., 1992). However, such remediation does at least provide greater amounts of "academic," albeit low-level, content to occupational students.

[39] While there are a few cross-curricular efforts in subjects other than writing, in math and critical thinking, for example, they are rare compared to Writing Across the Curriculum.

[40] Among institutions in the highest size quartile, 66 percent, 35 percent, and 92 percent provided these three forms of integration, compared to 25 percent, 20 percent and 77 percent of those in the lowest size quartile.

[41] Of districts in the highest quartile of funding per students, 46 percent report tandem courses compared to 34 percent in the lowest quartile; and 92 percent of the best-funded institutions provide remediation compared to 85 percent of those with the lowest funding.

[42] The number of students receiving Pell grants is not an especially accurate measure of low income because the fraction of low-income students receiving Pell grants can vary substantially among institutions depending on the aggressiveness of student aid offices and the kinds of programs students follow (see Grubb, W.N., and Tuma, J. (1991), *Who Gets Student Aid? Variation in Access to Aid. Review of Higher Education*, 14(3):359-383).

[43] For the lowest- and highest quartile institutions, the proportions are 57 percent and 42 percent for cross-curricular efforts, and 33 percent and 42 percent for tandem courses.

[44] For earlier recommendations along these lines, see Grubb, W.N., and Stern, D. (1989), *Long Time 'A Comin': Options for Federal Financing of Postsecondary Vocational Education*. Berkeley: MPR Associates for the National Assessment of Vocational Education, U.S. Department of Education.

CHAPTER 5

A LITERATURE REVIEW FOR TECH PREP

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INTRODUCTION

In the last few years a new educational initiative has emerged. This initiative, Tech Prep, has achieved unusually strong support from the Congress for such a young program and is currently being implemented across the land at a brisk pace. It is important, in the formative years of any new program, that periodic assessments take place assessing what we know, or need to know, about such initiatives. To that end, as a part of the National Assessment of Vocational Education (NAVE) the authors have conducted an extensive review of the literature including research reports, program documents, ERIC files, and academic publications, as well as an analysis of data collected by NORVE researchers involving two 50-state surveys, nationwide site visits to secondary and postsecondary institutions and participation in numerous tech prep conferences, workshops and summit meetings. Because Tech Prep is such a new phenomenon the existing research base is sparse. Most of the literature can be described as being either exhortative in nature, descriptive, or in the form of a "how-to" manual. In addition, since Tech Prep is a longitudinal program involving at least four years before a student can complete a sequence of courses, there are few analyses of program completers. Almost all the work so far has focused on process rather than program outcomes. So too, by necessity, will this literature review.

In an effort to explicate recent developments in Tech-Prep programs, this literature review presents the following five sections. The material in Section One presents a discussion of the economic and educational context in which Tech-Prep programs are developing. In Section Two, the definitions and features of current Tech-Prep programs are presented. In Section Three an in-depth examination of articulation is presented. This material is followed by an examination of planning in Section Four. Section Five covers the stages of development of Tech Prep programs. The concluding section, Section Six, summarizes the current status of Tech Prep.

1. FRAMEWORK FOR CHANGE: THE ECONOMIC AND EDUCATIONAL CONTEXT FOR TECH PREP

The publication of *A Nation at Risk* in 1983 by the National Commission for Excellence in Education provided the focal point for much of the school reform

effort of the 1980's. The Commission noted that: "More and more young people emerge from high school ready neither for college nor for work." Although the Commission noted further that "this predicament becomes more acute as the knowledge base continues its rapid expansion, the number of traditional jobs shrinks and new jobs demand greater sophistication and preparation".[1] As a result, the Commission's recommendations focused on improving the quality of that portion of the curriculum normally associated with preparing young people for college. In spite of its lofty rhetoric, the suggested approaches to the problem paid scant attention to non-college bound youth as a target audience or vocational education as a viable part of a school reform strategy. Responding to this pressure for reform, states increasingly focused on the college preparatory curriculum with special attention to strengthening graduation requirements, adopting statewide testing programs and increasing teacher standards. At the local level, schools increased attendance standards, increased requirements for graduation beyond the state requirements, demanded more homework, and required longer school days and years. Unfortunately, there is little to show for this decade of effort in terms of student achievement. Tests in reading, writing and civics yielded no improvement. And while scores in mathematics and science were up, the United States continued to lag behind most other developed countries.[2]

Vocational education was not seen as part of the solution and not surprisingly, school districts engaged in very little vocational education reform. This was due to a number of factors, the lack of attention paid to the school-to-work transition in national reform efforts, the notion in some quarters that strong academic preparation was the best preparation for work, and the generally low esteem in which many vocational education programs were held. Throughout the 1980's, school districts experienced significant declines in vocational education programs, due in some extent to the increased graduation requirements which pushed elective vocational education courses from the curriculum.[3] It was in this context that Dale Parnell, the Executive Director of the American Association of Junior and Community Colleges published *The Neglected Majority*, in which he decried the lack of attention devoted to those students in high school who were not college bound. Parnell noted that "at least three out of four of our students in the public schools are unlikely to achieve a baccalaureate degree." He ardently and eloquently argued the case for a new focus on the non-college bound student, the so-called "neglected majority." He proposed a new program, a program designed both pedagogically and substantively to attract and appeal to the student for whom a baccalaureate degree was not a viable alternative. Parnell called the first iteration of his new program "Careers Education," the delivery system which helps students develop the competencies required to function in the real-life roles of "learner, wage earner, citizen, consumer, family member, leisure-time pursuer, and individual." Parnell further identified the characteristics of this new model as including an "information-rich and experience-rich education

based upon life-role proficiencies." He called for the creation of a "learning centered bridge between the time honored subject-matter disciplines and the competencies required of an individual to cope with modern life." Parnell noted perceptively that the "academic and vocational desert of American education is the high school general education program." He concluded that "unfocused learning remains one of the prime barriers to achieving excellence for a host of high school students".[4]

Parnell's answer for all this was contained in his comprehensive plan for elementary and secondary schools and community' colleges. First, all of basic education would be infused with practical examples for the world of work and life roles. Even students in the primary grades should be able to see the relationship between what they are learning and the usefulness of that learning. Indeed career awareness in the elementary school should bring "more meaning, more experience, more rigor" to these early school experiences. Second, career exploration in the middle grades would involve a rigorous, multidisciplinary approach. Third, adolescents would engage in a new prevocational program which would explore all of the clusters and families of occupations. All students would explore all clusters.

The next step would occur in the first two years of high school and would include the development of a common core of learning, including communication skills, social sciences, mathematics and physical/biological sciences with a career education emphasis. In the eleventh grade students would choose one of three paths: (a) a college prep/baccalaureate degree major; (b) a 2+2 Tech-Prep Associate Degree major; or (c) a vocational cluster minor. Watered-down general education courses would be eliminated. The last two years of high school in the 2 + 2 Tech-Prep option would be closely linked with community colleges, so that all the coursework necessary to prepare students well for higher education would be completed. The central focus of the 2+2 program was to provide a seamless web in the various technical curricula, so that the resultant four years would be a sequential program in which high school teachers and community college faculty would plan and alter curriculum jointly to best guarantee a well-articulated program. The *Neglected Majority* provided a road map for comprehensive K-12 school reform. Parnell, in his role as the chief advocate for the community colleges, took his message to the Congress to seek federal funds for implementation of the high school and community college portions of the reform. It is important to note that Parnell's major concern was educational reform. His primary thrust was not economic development, but providing a meaningful education experience for what he perceived as the majority of students not currently well served by the traditional comprehensive high school program.

Subsequently, a series of important reports focusing on the broad array of skills required to improve the education and training for the workforce of the

next century were published. Such reports as *Workplace Basics: The Skills Employers Want*[5], *Workforce 2000*[6], and the reports of the Secretary's Commission on Achieving Necessary Skills (the SCANS Commission)[7] helped concentrate attention on the activities and programs schools can adopt to improve the quality of the school-to-work transition. At the same time, the reports were often critical of traditional vocational education courses. The Committee for Economic Development[8] stated that "(business) is not interested in narrow vocationalism and it charged that (many) vocational education programs are almost worthless (and) need to be disbanded and reshaped." *Workforce 2000* declared that there is no excuse for vocational programs that 'warehouse' students who perform poorly in academic subjects or for diplomas that register nothing more than years of school attendance."[9] *What Work Requires of Schools* reported that most schools have not changed fast enough or moved far enough in response to changes in work and the pressures on the schools of the past decade.[10]

The realization grew in the latter part of the 1980's that the nation had to take seriously the responsibility for preparing all students. The first alarm was sounded in *The Forgotten Half*.[11] In 1970, 14 percent of high school dropouts were either out of the labor force or unemployed. By 1988 this had increased by 118 percent to 31 percent, which translates into one of every three being either out of the labor force or unemployed. In 1970, only 6 percent of high school graduates, or one out of 17, were either out of the labor force or unemployed. By 1988, this had increased by 168 percent to 16 percent, translating into one out of every six being either out of the labor force or unemployed. In sum, the less educated were less apt to be employed.

Further, when these students were employed, they received substantially less income. Differences in skills, measured by differences in education, are increasingly associated with wage and employment differences across time. However, it does not necessarily follow that increasing the skills of those disadvantaged in the labor market will affect their abilities to gain employment. To do that depends also on the demand for more highly skilled labor, independent of changes in the characteristics of the labor supply.

Levin,[12] Levy and Murname,[13] and Bailey[14] argue that to the extent the pace of technology increases, there will be a general increase in the demand for better educated workers. In other words, as the need for the United States economy to adopt both innovative organizational structures and more highly technical equipment increases, the need for a highly skilled workforce becomes greater. It is of course impossible to accurately project the future of economic activity.

The 1990-2005 occupational projections of the U.S. Bureau of Labor Statistics suggest a continued shift of the occupational structure toward occupations that

use more skill. Although these projections must be treated with caution, the BLS analysis does suggest that the 15 year trend towards higher skills will continue, although less dramatically. Over the next 15 years, higher skill occupations are expected to grow just under twice as fast, as opposed to a growth rate over the last 15 years of two and a half times as fast, as the lower skilled occupations.

In its earlier development states the Tech-Prep movement was given a strong impetus by the timely confluence of the educational concerns expressed by Parnell, who saw Tech Prep as one part of a comprehensive school reform strategy, and the concern, expressed by employers and researchers, about the quality of workforce preparation and the projected demand for a highly skilled workforce.

In part then, the pursuit of this initiative is an outgrowth of education, government and business leaders responding to significant economic, technological, and social changes of the 1980's. These include structural changes in the economy linked to fewer industrial production jobs, more service industry jobs, a demand for trained technicians, and the need to improve the quality of education for all students, not just the college bound.

In 1940, the 101st Congress included The Tech-Prep Education Act in the reauthorization of the Perkins Vocational and Applied Technology Act. The Congress stated:

> In recognition of the recent changes in the labor market, and the challenge of worldwide economic competition, there is a significant need to prepare youths for success in the ever changing technological workplace. This preparation can be provided through a 4-year educational program grounded in the development of comprehensive instruction based on articulation agreements between secondary and postsecondary institutions.

The Congress appropriated $60 million in the first year, which was to be increased to $90 million in the second year for planning and implementation of Tech Prep. Consortia consisting of high school and community colleges are eligible recipients. In the next section we will identify the key components of Tech-Prep programs.

2. DEFINITIONS AND ESSENTIAL FEATURES OF TECH PREP

Congressional language in the Tech-Prep Act of 1990 included:

> Technological advances and global economic competition demand increased levels of skilled economic preparation on the part of

> youths entering the workforce; and, systematic technical education articulation agreements between secondary and postsecondary vocational educational institutions are necessary for providing youths with skills... and intense technical preparation is necessary for finding a position in a changing workplace.

The educational strategy selected by the Congress was the adoption of a series of provisions, quite similar to those outlined in the secondary and postsecondary portions of *The Neglected Majority*[15] and Tech-Prep Associate Degree which defined Tech Prep as a "carefully designed curriculum that engages a high school student in a four-year (two years of high school plus two years of community college) or six-year (four years of high school plus two years of community college) plan to gain the competencies (knowledge, skills, and values) required for technical careers."[16] Tech-Prep models included a common core of course work for all students in the first two years of high school leading to a student decision in the junior year of high school to enroll either in a college prep, vocational cluster or Tech-Prep Associate Degree program. The college-prep student would enroll in those programs required for entrance in a college or university curriculum. The vocational cluster program enrollee would take courses leading to immediate employment upon graduation from high school. The Tech-Prep student would take courses on the high school campus and, where feasible, on the campus of the local community college campus.

The high school Tech-Prep curriculum is designed to prepare students for advanced technical specialization in the community college. Tech Prep runs parallel to college prep, uses a common foundation of mathematics, science, communications and social sciences to build advanced-skills, is built on applied academics, and uses a competency-based core curriculum structured around a career cluster of occupations. The high school curriculum places a heavy emphasis on building a strong foundation (both academic and vocational), leaving much of the advanced technical courses for the community colleges. The expectation is that at the completion of the program, the student would have completed all the coursework necessary to obtain an associate degree in the community college (thus the common appellation TPAD -- Tech-Prep Associate Degree).

Ramer,[17] using a Delphi process with 8 national experts and local groups of educators from community colleges, secondary districts and regional occupational centers and programs further detailed 2+2 components:

> *Purpose*: The purpose of a program is to eliminate unnecessary duplication of coursework, thus offering time-shortened curricula and a smoother transition from one educational level to the next.

Participants: The essential participants are the community college and high school. The programs are developed jointly by administrators and faculty of participating agencies.

Criteria for Development: programs should be developed in an occupation for which the demand for employment is substantiated and the knowledge and skills are greater than can be met in a high school or community college program alone.

Curriculum: Curriculum requirements should include technical skills, written and oral communications, mathematics, interpersonal skills, science, and job-search skills.

College Credit: Students completing the high school courses may receive college credit for that work as long as the basic skill competency requirements for the equivalent college courses have been satisfied. Students who earn college credit for high school courses with a formal articulation program may apply those credits toward the major.

Length of Program: The length of time needed by a full-time student to complete the curriculum depends on the nature of the program.

Program Award: The student completing a program receives an associate degree or certificate of achievement depending on the nature of the program. The Congress, in the Tech-Prep Education Act of 1990 additionally refined the concept by defining a Tech prep education program as a "...combined secondary and postsecondary program which:

(A) leads to a two-year associate degree or a two-year certificate,

(B) provides technical preparation in at least one field of engineering technology, applied science, mechanical, industrial, or practical art, or trade, or agriculture, health, or business,

(C) builds student competence in mathematics, science, and communications (including through applied academics) through a sequential course of study, and

(D) leads to placement in employment."

In developing regulations for the implementation of the Tech-Prep Act, the United States Department of Education (consistent with the language of Perkins) specified desirable components by awarding preference points to projects which:

- provide for effective employment placement activities or transfer of students to our year baccalaureate programs

- are developed in consultation with business, industry and labor unions

- address effectively the issues of dropout prevention and re-entry and the needs of minority youth of limited English proficiency, youth with handicaps, and disadvantaged youth.

The Tech-Prep model is an emerging, ever-changing concept. Nevertheless, it is possible to identify the key components of Tech-Prep programs and to further identify how the concept of Tech Prep incorporates many of the important research hypotheses currently under study.

1. Articulation

   The principal defining characteristic of Tech Prep is curriculum articulation. Tech Prep represents an advance over prior articulation efforts in that the articulation occurs between programs or majors (e.g. health, graphic arts, etc.) and is not limited merely to courses (e.g. welding, shorthand). Enhancing the connection between curricula in high school and community colleges has important advantages. Most importantly, by reducing duplication and by making expectations clearer, it makes it possible to increase the level of technical expertise of program completers.[18, 19, 20]

2. Integrating academic and vocational education

   Earlier efforts at articulation (including most 2 + 2 programs) made little or no attempt to integrate the vocational and academic curriculum at either the high school or community college level. Although many Tech-Prep programs, especially at the community college level, are only beginning their work to bridge the gaps between academic and vocational education, it is clearly a priority activity.[21] The relative development of this component of Tech-Prep programs is often a good indicator of program sophistication. Strengthening academic preparation and emphasizing contextual learning should lead to improved learning and to better prepared students.[22]

3. Enhancing the connection between work and school

   Another characteristic of quality Tech-Prep programs is the degree to which programs actively involve the business and labor community. The older, more sophisticated programs tend to have better developed

school-to-work linkages. Reinforcing school work by providing experiences in the work place which utilize concepts learned in school and linking school work to tasks undertaken in the workplace will lead to improved academic knowledge and work skills.[23]

4. Emphasizing core curriculum and sequences of courses

Another distinguishing characteristic of quality Tech Prep programs is the notion that all students in a school should have a "core" or base curriculum. That curriculum should include academic courses of substance and not consist solely of "watered down" general education courses. In addition, students should be taking orderly sequences of courses each of which builds on a knowledge base of the preceding work. Students successfully completing sequences of courses and ultimately gaining a postsecondary degree and/or certificate should possess greater technical skills, have greater flexibility to respond to future changes in the workplace and have better prospects for lifelong earnings.[24, 25]

5. Outcome-oriented programs

Programs with specific competency based curriculum and with specific goals (job placement, or continuing higher education) can better can be held accountable for success. A distinguishing characteristic of advanced, sophisticated, high quality Tech-Prep programs is whether they have adopted a competency based curriculum and have accountability mechanisms in place. Many Tech-Prep programs have not adopted outcome-oriented programs, but like integration efforts, attention is being paid to this important component.[26]

In the next section, we turn to a full treatment of the primary distinguishing characteristic of Tech Prep -- articulation.

3. ARTICULATION

The development of Tech Prep is typically associated with previous efforts to establish articulated course agreements between community colleges and local high schools. The most widely cited research investigations of national articulation efforts were conducted by Bushnell,[27] Long et al.,[28] and McKinney et al.[29] Previous definitions of articulation, and descriptions of articulated programs pervade current efforts to define and implement this critical Tech-Prep component. Because of the significance that previous articulation efforts have had on the development of Tech Prep, we devote this section to (a) an examination of the concept of articulation, (b) a presentation of the most common forms of articulation agreements, and (c) a description of

the relationship between previous articulation efforts and current Tech-Prep programs.

Research Objectives and Design

The objectives of previous research on articulation were (a) to identify procedures and policies that facilitate articulation, [30, 31] (b) to review the state-of-the-art in articulation,[32] (c) to identify types of barriers that appear to influence the attainment of outcomes claimed for articulation,[33,34] (d) to determine a definition of 2 + 2 programs,[35] and (e) to examine the long-term impact of 2+2 demonstration sites.[36]

To achieve these objectives, the investigators used similar primary methodologies, including exemplary program site visits and telephone and mail questionnaire surveys to state agency personnel as well as to postsecondary administrators and faculty. For example, Long et al.[37] investigated a total of 18 programs or articulation sites selected from 72 nominated sites. The researchers conducted nine site visits and nine in-depth telephone-mail surveys. McKinney, et al. (1988) conducted site visits to five exemplary programs "operating for at least three years," and mailed questionnaires to secondary (n=179) and postsecondary (n=70) institutions. Rarner[38] used a Delphi process with eight experts to identify issues from a national perspective, and two comparative groups from community colleges and secondary districts, and regional occupational centers and programs to identify issues from a state perspective. In the NCOE[39] study, a 15 item questionnaire was mailed to postsecondary institutions (n=675). ETI[40] reviewed model demonstration project materials, collected baseline data from secondary students and conducted site visits to 21 sites in California.

There exists a high degree of consensus among researchers and practitioners on the definition, purpose, and benefits of articulation[41, 42, 43, 44, 45]. McCormick [46] typically defines articulation in terms of process (e.g. the coordination of education systems) and outcomes (e.g. prevention of duplication of credit).

> Articulation is a process for coordinating different levels and/or systems of education. The purpose of educational articulation is to enable the learner to make a smooth transition from one level/system to another without experiencing delays, duplication of effort, or loss of credit.
>
> Articulation is an arrangement of components of various levels of vocational education in a connected sequence so that individuals choosing more than one level of instruction can move on to the next level without either gap or overlap in the curriculum.

Articulation often entails specific actions: (a) joint institutional issuance of policies and procedures, (b) standardization of vocational education curriculum based on employer requirements, and (c) establishment of local and state advisory committees for articulation for each program area.[47, 48] Successful articulation efforts require coordination and cooperation from all participants, and hold the promise of eliminating duplication of course work for students who participate in the program.

There are many stated benefits of articulation. The most general and interrelated purposes are to increase services for students, improve educational programs, increase student retention, and reduce program costs. Furthermore, the purpose of articulating vocational curriculum is to (a) encourage student career development through improved programming, (b) increase the time available for vocational training programs, (c) facilitate the transition of students from one educational level to another, and (d) increase the number and quality of graduates available for business and industry.

Ideally, the advantages of articulation include benefits to students, educational institutions, and the community at large. For instance, the frequently cited advantages to students include better preparation for work, the opportunity to earn college credit for secondary courses, elimination of duplicate course work, and a more efficient use of time and money. Other researchers[49, 50] also argue that an advantage for secondary students engaged in well articulated programs is increased self-esteem and motivation from earning college credit while still in high school.

Finally, some researchers argue that articulated programs are an effective means of confronting reduced funding for education and increased demands for accountability.[51, 52, 53] They argue that providing more effective articulation programs enhances the public image of the institution, and encourages local employers to recognize program graduates as a source of well trained employees. In turn, the effectiveness of an educational institution is validated when job placement rates increase as business and industry managers are able to hire new employees with a stronger set of skills built over a several year period.

Forms of Articulation Agreements - Advanced Placement and Advanced Skill

Secondary and postsecondary institutions provide the benefits of curriculum articulation by establishing written agreements. These agreements are written for various forms of articulation such as: faculty certification of courses, equivalency examinations, tuition provisions, and dual enrollment. In addition, agreements can be written to serve local populations (e.g. between one community college and one high school district) or to serve regional

populations (e.g. between several high school districts, several community colleges and, in some cases, four-year colleges).

Although there are many forms of articulation, there are at least two sets of distinctions that prove useful. The first of these is based upon the difference between two operational program goals: providing students with coursework that generates (a) advanced placement credit, or (b) advanced skill competence.[54, 55, 56] Ideally, the objective of these agreements is to establish a curriculum that offers the benefits of both (a) shortening the time for secondary students to complete postsecondary coursework (advanced placement), and/or (b) providing the student with advanced exit-level competencies needed to enter the workforce or postsecondary institutions.

The distinction between these two forms of articulation are presented in detail by Long et al.[57] It is important to note that typically Tech-Prep programs begin as outgrowths of previous articulation efforts and tend to provide courses that count, like their earlier counterparts, for advanced placement credit. This emphasis is primarily designed to shorten the time it takes to complete a particular program. The Tech-Prep notion of articulation is that students will gain greater skill levels by taking well articulated, sequential programs. For example, results from site visits conducted during 1990-91 revealed that many educational institutions referred to any articulated vocational program as "Tech Prep" as long as the curriculum was associated with vocational or technical program areas (e.g., business, health occupations, engineering).[58] The primary focus of these agreements was merely to guarantee advanced placement with little concern about increasing the skill levels of program completers. These findings correspond with the Long et al.[59] definition of simple advanced placement programs where:

> the instructors from the community college and several local high schools meet to review course syllabi. They then agree on which high school courses are more or less equivalent to introductory college courses. Matriculating students receive college credit via a written recommendation from high school instructors.[60]

In addition, Bragg[61] reports that few of the eight consortia involved in the NCRVE study spoke about the need to develop the "advanced skills" component that extends the postsecondary technical curriculum beyond that which is commonly available in existing non-Tech-Prep community college vocational education programs.

Course Articulation and Program Articulation

The second important distinguishing characteristic between traditional articulation agreements and Tech-Prep articulation agreements revolves around

the distinction between course and program articulation. Articulation agreements historically have been written for individual courses in a selected vocational or technical program area (e.g. business, health occupations, drafting and design). More specifically, course articulation means providing the prerequisites to specific community college courses in secondary schools, such as introductory drafting in high school followed by advanced drafting in community college. Program articulation goes beyond the traditional course mode and requires the development of a coherent sequence of basic and more advanced coursework, including mathematics and communications skills along with technical courses in program clusters like business or health occupations. Program articulation then includes the articulation of multiple related courses at both the high school and the community college.

Most secondary schools and community colleges as yet do not distinguish between these two types of articulation and many of the local consortia are still wedded to the earlier model in which course articulation was the mode. In addition, recent observations[62, 63] reveal that all schools acknowledge the importance of including appropriate academic courses -- mathematics, science, and English -- in Tech-Prep programs. However, the actual selection of individual courses which make up the core varies widely from school to school. Some schools strongly recommend that Tech-Prep students enroll in a selection of routinely offered academic courses such as algebra, English and physics. In others, students in Tech Prep are encouraged, or required, to enroll in a sequence of applied academic course (e.g. applied math, applied communications, principles of technology).

Articulation Efforts and Tech-Prep Programs

In general, results from recent investigations[64, 65] indicate that the few programs that have operated for at least five years have advanced their scope and objectives beyond the articulation of existing courses that merely provide advanced placement credit. Most importantly, these programs have incorporated into their curriculum the articulation of completely new courses, course sequences in an entire program area, and the development of academic and vocational-technical core curriculum for programs that provide training along a career ladder with multiple exit points for the student to enter employment. These variations are examined further in the forthcoming section on stages of Tech-Prep program development.

In sum, the introduction of (and experience with) Tech-Prep programs has led, over time, to a more advanced concept of articulation--one that includes the expansion of the concept from the articulation of individual courses to the articulation of full-blown programs or majors. Most Tech-Prep programs are still operating at the former, more elementary stage.

A second important Tech-Prep contribution occurs when consortia move, over time, from the simpler, advanced credit mode to the more complex, advanced skills mode, in which programs are designed to add specific technical content to programs and not merely shorten the time it takes to acquire the same knowledge. Again, most Tech-Prep programs are in the earlier, less sophisticated stages of development and have not as yet achieved the program maturity concomitant with these more advanced forms.
The next section deals with the subject that makes up the largest body of research done in Tech Prep--planning and implementation.

4. TECH PREP PLANNING AND IMPLEMENTATION

Planning and implementation of new Tech-Prep initiatives art largely in the hands of state educational agencies and local consortia, whatever results from this new legislation is likely to occur because of efforts put forth by these entities, either alone or in concert with each other. The legislation speaks only generally about the components of a Tech-Prep educational process; it is mute on evaluation and program improvement as well as integration of academic and technical curricula (beyond applied academics), both of which are specified in other sections of Perkins II. Components that are mentioned in the legislation, providing some indication of what must be developed for full implementation of Tech Prep, are: (a) articulation agreements, (b) 2+2 articulated Tech Prep curriculum, (c) in-service training for teachers conducted jointly with other institutional participants in the consortium, (d) training for counselors, (e) equal access for members of special populations, and (f) preparatory services for all participants. Research conducted by Bragg[66] and Layton and Bragg[67] indicates that state and local educational agencies are addressing only some of these components (e.g., articulation agreements, 2+2 curriculum, in-service for teachers and counselors); other components such as equal access or preparatory services appear to be neglected during the early stages of planning and implementation.

To qualify for a Tech-Prep grant, local consortia--taking on a multitude of forms but typically comprised of a public community college and its surrounding secondary school districts and businesses and industries--must develop a plan to address components specified in the legislation. In actual practice, whereas the idea of using a consortium-type approach may enhance the potential for implementation of an educational innovation,[68] our research suggests the act of engaging involvement and support from multiple entities may require a significant chunk of the three-year time allotted for Tech-Prep implementation.[69] Consequently, it may be difficult for Tech Prep to demonstrate significant impact on constituencies (e.g., educational institutions, students, businesses) due to this protracted adoption period.

To its credit, the federal legislation for Tech Prep is not focused solely on a particular content area or pedagogical approach. Rather it is encompassing, thereby providing the opportunity to link institutions, personnel, programs, stakeholders, and support services in innovative ways to benefit students. Again, Huberman[70] advocates cross-institutional models composed of teams and networks as a way of implementing educational innovations, much the way some consortia are approaching Tech Prep (see section on "local implementation processes" later in this report). By taking this approach, program goals, curriculum, administrative practices, and outcomes can vary depending upon the needs of stakeholders involved in a particular local Tech-Prep initiative. In addition, administrators and faculty may be more likely to find this type of planning environment conducive to creative thought and experimentation because of the opportunity for cross-fertilization among various organizations, including among education and private-sector organizations.

These preliminary observations, most of which come from on-site research conducted by Bragg with individuals involved in the very early stages of Tech Prep implementation, provide only a glimpse at the implementation process being employed for Tech Prep. Clearly, as efforts mature, a more exhaustive research approach is required. To ascertain direction for this future research, therefore, we sought information from previously reported literature on topics pertinent to Tech Prep and implementation of educational innovations in general. In addition, we share preliminary findings from our research on Tech-Prep planning and implementation, supported by the National Center for Research in Vocational Education. The next section of this report provides a discussion of the literature.

Planning and Implementation Processes for Tech Prep

Investigations that have followed passage of Perkins II have been conducted by staff of the NCRVE during 1991 and 1992. Layton and Bragg[71] have conducted a study specifically related to planning and implementation to examine the initial start-up of Tech Prep under the federal legislation. This research was designed to determine the status of Tech-Prep planning and implementation in the fifty states and District of Columbia during the initial year of funding, July 1991 through June 1992 and subsequent years beginning in July 1992. Data were with telephone surveys in September-October 1991, and again in September-October 1992. Field visits were made to four states located in the Southeast, Southwest, Midwest, and Northwest between January and June 1992.

The study was designed to describe both individual and organizational behaviors during initial implementation of Tech Prep. The overall objectives were to: (a) describe goals, philosophies, policies, and practices associated with

state and local planning and implementation of Tech Prep, and (b) examine the context in which Tech Prep was being implemented and consider how this context influenced the implementation process. Planning and implementation strategies were documented for the purposes of:

- describing processes carried out by local consortia,
- providing information about implementation to local, state, and federal agencies,
- identifying perceived barriers to implementation, and
- establishing a baseline of knowledge for later process and outcomes evaluation.

Summary of Findings on Grants

By the spring of 1992, all 50 states and the District of Columbia made Tech-Prep grant awards. The majority of grants were awarded by December 1991. In the initial year July, 1991-June, 1992, all but one state awarded planning grants. Thirteen states gave more than one type of grant, usually both planning and implementation grants. One state awarded only demonstration grants.

Nearly 82% of all grants awarded by the states in FY 1992 were for planning; in FY 1993 that percentage dropped to about 40 percent (Table 5.1). Only a very small percentage, approximately 5% of the states awarded grants for demonstration or exemplary sites. These data suggest the infancy of Tech Prep throughout the country. On average, 15 Tech-Prep sites were funded per state.

Competitive grant processes predominated in the award of Tech-Prep funds to local consortia. Many state agency personnel described the use of this approach as critical to facilitating successful models and practices that could be disseminated throughout their state and in ensuring that funds would not be wasted on sites that were not highly motivated to implement Tech Prep. A few states used a formula approach to ensure some level of funding to all local consortia.

In the initial years of federal funding, only three states devised approaches that were both competitive and formula (Table 5.2). An example of this approach was used by the State of Michigan where all local consortia were awarded a small amount of money to get Tech Prep started and then awarded larger competitive grants six months to one year later. These grants were designed to be used by local consortia to implement particularly promising plans for Tech Prep.

Table 5.1
Tech Prep Grants Awarded in FY 1992 and FY 1993

Grant Types	Number of Awards in FY 1992	Number of Awards in FY 1993
Planning	591	362
Implementation	89	487
Demonstration/ Exemplary/Continuing	44	15
Total	724	864

Note: N=51 for 50 states and District of Columbia unless otherwise indicated.

Funding levels varied greatly among the 50 states in FY 1992, from $5,000 to $250,000 for planning grants. Implementation grants were nearly as varied, from $50,000 to $200,000. It is interesting to note that in FY 1992 the average planning grant was approximately $56,000 and that implementation grants were nearly twice that level, $124,000 on average (Table 5.3). Demonstration or exemplary grants were even larger, averaging $180,000. In FY 1993, funds for new planning and implementation grants were fairly similar; the average planning grant was $66,000 and implementation grant was $74,000. This shift in funding levels from FY 1992 may reflect the recognition that funding requirements for Tech Prep do not vary greatly from the initial to the second year. It may also indicate the need for states to find more sites, thereby lowering the amount of funds available overall.

Table 5.2
Grant Processes Used in FY 1992

Grant Process	Number of States and DC
Competitive	43
Formula	5
Combination Formula & Competitive	3

Table 5.3
Average Level of Funding by Grant Type in FY 1992 and FY 1993

Grant Type	Average Dollars/State FY 1992	Avg. Dollars/State Continuing FY 1992	Avg. Dollars/State New FY 1993
Planning	$56,900	$70,000	$66,000
Implementation	124,000	99,000	74,000
Demonstration/ Exemplary	180,000	234,000	NA

Tech-Prep Philosophies and Policies

The 50 states espoused fairly similar policies and philosophies to begin implementation of Tech Prep. Nearly all the states described the primary driving force behind their Tech-Prep policy as the federal Perkins II legislation. Among the common statements offered by the states for the purpose of implementing Tech Prep were:

- to ensure better transition of youth from school to work
- to provide applied academics and employability skills
- to provide a comprehensive career preparation program that would begin earlier than high school
- to eliminate the general track
- to upgrade vocational education and strengthen the academic focus of secondary education

There were two divergent perspectives expressed by the states concerning the relationship between Tech Prep and vocational education. In the first, Tech Prep was viewed as a reform of vocational education and a vital part of attempts to upgrade it. In the other, Tech Prep was not seen as vocational education but as a larger educational restructuring effort involving vocational and academic education.

Some states have taken a legislative approach to Tech-Prep policy. Legislation enacted in 1991 in Wisconsin required that each school board establish a Tech-Prep program in each public high school in the district in coordination with vocational, technical, and adult education district directors. New York

legislated the Work Force Preparation Program, which essentially mirrored the federal Tech-Prep legislation at the state level.

In South Carolina, an amendment to the state plan called for a Tech-Prep education program entitled "Preparation for the Technologies," which again echoed the federal program. In addition, the legislation called for a restructuring of the Department of Education to transform it from a regulatory agency to a service agency as part of the state's Total Quality Education effort.

The telephone survey conducted in the fall of 1993 on FY 1993 grants focused on how states planned to evaluate local Tech-Prep initiatives. During this telephone interview, 19 of the 30 state coordinators were read a list of ten outcome statements gleaned from prominent literature sources and asked whether each of these was included in their state's list of outcomes. The results are presented in Table 5.4.

Table 5.4
State Plans for Outcomes Evaluation

Outcome	Status (%)
Improved academic skills (e.g. communications, mathematics, science)	100
Improved secondary program completion rate	100
Improved job placement rate	84
Improved technical skill	79
Increased career awareness	79
Increased employer satisfaction	74
Improved problem solving and critical thinking skills	63
Improved attitudes toward perceptions of technical careers	42
Improved student self-esteem	37

Factors Influencing Tech-Prep Implementation

An important focus of the study by Bragg[72] was on understanding factors (also referred to as barriers or issues by Tech-Prep planners) that influence Tech-Prep planning and implementation. A number of factors were identified through data collection with the 30 states and subsequent site visits. They are:

- clarity of purpose
- leadership development
- control of administration and funding
- flexibility in implementation and evaluation
- establishment of meaningful partnerships
- tracking within high school curriculum
- maintenance of momentum
- resource needs

Clarity of purpose is critical to the success of any educational innovation.[73] Many Tech-Prep planners interviewed described the need to get consensus about:

- the purpose of Tech Prep
- who should participate
- what should be accomplished
- what the components should be
- how implementation should be conducted

Leadership at all levels of the educational system is needed to ensure that Tech Prep is implemented successfully. Staff development is essential to ensuring that people can plan, implement, and evaluate Tech Prep. Although it appears a sizable proportion of federal funding is being used for staff development at the local level, it appears that even more emphasis on staff development is needed.

Control of Tech-Prep funding and administration primarily rests within traditional state and local vocational education agencies, possibly to the detriment of the initiative in the long term. Many of those interviewed described problems occurring with implementation when Tech Prep was isolated from the entire educational enterprise and viewed as another vocational education program. This focus was viewed as particularly threatening to effectively integrating vocational and academic subject matter, a vitally important component of Tech Prep. Release of general education federal or state funds for Tech Prep could create a fairer and more realistic environment for implementation of the integration concept called for in the Perkins II legislation.

A perspective shared by the vast majority of personnel representing state agencies interviewed for our study was one of allowing local consortia maximum flexibility in implementation of Tech Prep. Under that directive, many agencies appeared to be providing minimal definitions, goals, or expected outcomes. While this strategy may prove to be successful in the long run because of its potential for stimulating local models; there is also a risk that it will result in "business as usual."

With this approach, the burden of establishing goals and parameters for implementation is placed primarily on the local level. State agencies taking this posture are encouraged to reinforce local initiatives with technical assistance and staff development to help identify and redirect problems that arise during the implementation phase. Furthermore, the need for evaluation through a partnership between state agencies and their consortia is heightened.

Partnerships are a necessity for full implementation of Tech Prep, according to the federal legislation. Depending upon past and current relationships, some Tech-Prep planners seemed to be struggling with establishing fair and meaningful partnerships among:

- the levels of education (i.e,, high school and 2-year college, or 2-year college and 4-year college),
- academic and vocational education teaching and curricula, and
- education and business, industry, and labor constituencies.

For example, sometimes business and industry or post-secondary education was viewed as trying to exert too much control over high school curricula. In other cases, either vocational or academic education was seen as too aggressive in establishing the newly-articulated Tech-Prep curricula. In still other cases, four-year colleges were refusing to consider Tech-Prep curriculum as comparable to college prep.

Without meaningful partnerships, it will be difficult to establish Tech Prep effectively. Both state and local educational agencies seemed to be learning under fire about what could influence the success and failure of their new partnerships.

Resources

Resources in terms of dollars, people, curricular materials, facilities, and technological innovations are critically needed to make Tech Prep successful. Financial resources provided by the federal Tech-Prep Education Act provide the seed money to initiate Tech Prep; however these monies cannot be expected to sustain it. They also appear to be distributed somewhat unevenly, especially across local sites within some states

Additionally, several states -- particularly those with large rural areas or urban centers -- view their federal funding to be too limited. If Tech Prep is to be successful, additional resources are needed to ensure that widespread adoption can occur. These funds are particularly critical for areas that traditionally have difficulty making educational innovations work.

Local Implementation Processes for Tech Prep

Whereas the findings previously reported could be considered a macro view of Tech-Prep implementation, these next observations represent the micro. Consistent with our goal of understanding the Tech-Prep planning and implementation process, Bragg[74] identified eight consortia located in four states for in-depth study. These consortia were selected through a nomination process first involving a panel of experts with knowledge of the federal Tech-Prep initiative and then narrowed further by state agency officials. Approximately one week resulting from 2 separate visits was spent by two researchers in each of the eight sites over the January to June 1992 time period. Naturalistic inquiry methods were used to understand the implementation processes and contextual factors influencing them.

Planning and implementation strategies observed in the eight local sites were highly individualized, reflective of the unique characteristics of communities, institutions, personnel, and stakeholders involved in them. Individuals interviewed were quick to point out how federal and state definitions and guidelines for Tech Prep did or did not fit the local context. These individuals made statements such as, "In our school, Tech Prep means" or "We're a little different from the rest, we think about Tech Prep as..." They were also insistent that planning and implementation of Tech Prep was not occurring in a step-by-step linear fashion. The majority of project leaders in one state (where our research extended to data collection involving all seventeen first-year planning

projects) spoke about planning phases being interrelated rather than discrete steps occurring on a one-shot basis.

Given these caveats and understanding the perspectives shared by local planners of Tech Prep, we believe that a pattern indicative of Tech-Prep implementation is evolving. That pattern is not linear or fixed, although there seems to be a relative sequencing of activities beginning with goal setting, continuing with planning activities within and across institutions, and eventually reaching implementation. The components of this process which will be described below, include:

- definition and strategy setting
- consensus building
- selection and orientation of planners
- consortium-level planning
- wide-scale orientation and recruitment
- initial implementation.

Definition and Strategy Setting

Once a local consortium was notified that it had been awarded a Tech-Prep grant, a search began for a guiding vision for the initiative. This activity usually entailed informal and formal efforts to develop goals, establish definitions, and create a local philosophy for Tech Prep. This phase of the project usually required substantial time and energy from project leaders. Four to six months was typical for focusing on this definition and strategy-setting activity. The notion of continuous implementation, tied to continuous improvement, was shared by some project leaders.

Consensus Building

Once the concept of Tech Prep began to crystallize for project leaders, there was attempt to share its goals and purposes with others and to begin to get commitment from others who would be involved in planning the initiative. Since Tech-Prep project leaders were typically mid-level school or college vocational administrators and often limited in their contact with such key groups as academic educators and guidance counselors, concerted efforts had to be undertaken to inform these people about Tech Prep. Often, at this stage, numerous presentations were given during meetings with executive-level leaders and boards of schools, colleges, businesses, and the community to

create an awareness of Tech Prep and obtain information useful in capturing and reflecting a broad-based approach.

Selection and Orientation of Planners

Typically, only a small number of individuals were involved in the day-to-day management of a Tech-Prep initiative. Major commitments of time and energy to planning were gained from project leaders and their assistants, often known as project coordinators. In fact, most projects operated with a full-time coordinator funded with the Perkins II grant who, among other duties, maintained the flow of information and activities across the consortium. It is important to note that our research uncovered few consortia actively involving students parents in planning and implementation, representing an area of concern for us given the importance of Tech Prep to student decision making about careers and further education opportunities.

What skills and knowledge were required to direct a Tech-Prep planning or implementation effort? Nearly all Tech-Prep planners and project leaders involved in our research thought that skills and knowledge in project management were critical to the success of Tech Prep. Those interviewed described the importance of project leaders having expertise in broad and diverse education-related issues. It is important to note, however, that our research has identified consortia that are employing project leaders from private-sector partnering organizations and that these consortia view these individuals as being effective project leaders as well. Clearly, more research is needed to determine the qualifications necessary to guide Tech Prep through the adoption, implementation, and institutionalization stages.

How were individuals selected to be part of planning and implementation processes? Typically, two approaches were used: (a) invitations were extended to individuals thought to be innovators by school, college, and business leaders, and/or (b) volunteers were sought once the initiative was communicated to a wide array of individuals in the partnering institutions. In either case, these individuals were thought to be capable of spearheading Tech-Prep's local implementation.

Consortium-Level Planning

During or following this orientation and development phase, individuals were organized into planning teams by site (e.g. schools and colleges) and/or by functional area (e.g., curriculum, evaluation, marketing). These teams may have had an individual designated or elected as team leader, especially when they functioned in a particular site. Once these teams were identified and charged with a particular planning task, they became very involved in Tech Prep. Often planning efforts at this stage took place on a fairly regular basis,

sometimes with only a single site-based team interacting or during large consortium-wide events to facilitate cross-site communication. It was through these teams that an environment conducive to implementation of Tech Prep seemed to be created. This environment was one facilitative of dialogue among teachers and administrators within and across institutions to generate new ideas and reach common understanding about Tech Prep.

Curriculum Alignment Across Levels of Education

There were a number of activities that occurred as a part of coordinated consortium-wide planning. Usually early in the academic year consortia addressed the problem of curriculum alignment across levels of education (i.e., secondary to postsecondary in most cases; in some consortia alignment included elementary and junior high or four-year higher education levels). From this activity, consortia began developing basic programs of study early to get courses into time tables and information to counselors for scheduling purposes. Sometimes this activity was completed as early as November for a subsequent academic year, thereby necessitating the rapid formation of articulation agreements and course sequences. Then, this information was translated into information needed by guidance counselors, students, and parents for course decision making.

Review of Existing Academic and Technical Curricula

Another important activity that typically occurred fairly quickly once planning teams were formed involved review of existing academic and technical curricula at the secondary and postsecondary levels. In almost all sites, a conclusion was reached by review teams that emphasis would need to be on modifying existing courses because of limited resources for new curriculum. To that end, all eight sites had investigated off-the-shelf applied academic courses developed by the Center for Occupational Research and Development (CORD). While none of the eight sites used these courses as the entire foundation for Tech Prep, five of the eight did proceed to a try-out phase with them. Varying levels of sophistication (e.g., from review to field tests) were described by consortia in involving faculty in using packaged applied academic materials or incorporating chunks of these curricula into existing academic or technical courses. Of the eight sites, three decided to not incorporate these curriculum materials into their Tech-Prep initiatives at the time, usually citing cost as the prohibitive factor.

Wide-scale Orientation and Recruitment

Finally, once a baseline of understanding was obtained and key components such as curriculum were being planned and tested, an attempt was made to create awareness about Tech Prep with a larger circle of stakeholders. Often

Tech-Prep planners -- rather than an administrator who is removed from direct implementation of Tech Prep at the classroom level -- were involved in delivering information about Tech Prep (i.e., its goals, processes, outcomes). In addition, students, parents, community leaders, and the general public were informed about Tech Prep. These efforts seemed to help achieve awareness about the initiative and to create opportunities to get others involved in it to enhance ownership by these stakeholder groups.

Taking Steps Toward Implementation

Typically, by the end of the planning phase--often the end of a first-year funding cycle--sites sought to have partnering organizations committed; broad representation of stakeholder groups involved in planning curriculum and marketing programs; and even more staff, employers, students, parents, and members of the general public aware of the initiative. Then, during implementation, the focus could be placed on counseling and enrolling students, strengthening both academic and technical curriculum areas, involving more partnering institutions and employers, and improving the planning and implementation approach by learning from past experiences and moving into more sophisticated curriculum and evaluation arenas. By enhancing the interdependence among people and partnering institutions, the importance of the initiative was reinforced and the level of commitment to implementation was heightened.

Summary of Planning and Implementation of Tech-Prep Programs

Throughout the entire process, there was continual questioning about what was being accomplished, whether and how the initiative could be structured, who should be identified as the target group of students, and how success could be measured. A learning-by-doing approach appeared to be occurring and actually seemed to be instrumental in helping individuals become more knowledgeable about, committed to, and creative in planning and implementing Tech Prep. It is this notion of learning from the continual change process to create the context for the next stage of implementation as described by Fullan[75] that seemed to be occurring. Unique among the eight consortia studied, one consortium anticipated and facilitated planners' needs to learn about and engage in Tech Prep interactively by structuring professional development as central to the entire implementation process. In that site, it was difficult to differentiate planning from staff development or from curriculum development. Yet, there was a sense of involvement and accomplishment that seemed to move the implementation along in a coordinated and energetic fashion. Of course, more research is needed to determine how this approach influences the eventual effectiveness of Tech Prep implementation.

In summary, while many facets of Tech Prep could and should be explored in the fixture as the initiative matures, this rough sequence of activities represents a general implementation pattern observed in eight consortia, Certainly our efforts to document Tech-Prep planning and implementation are only beginning. Clearly, many factors influence how the process occurs in these sites and our research has attempted to focus on initial understanding of that process.

5. STAGES OF DEVELOPMENT: OPERATIONAL FEATURES OF TECH PREP

Tech-Prep programs throughout the country are as diverse as the multiple sites and programs in which they operate. The statutes and regulations governing Tech Prep are purposefully vague, allowing much latitude on the parts of states and local Tech-Prep consortia to provide programs that best suit the needs of their particular locales. In addition, we have discovered that this variation exists even among the most mature, experienced programs. There is also great variation even within consortia. Some high schools may have advanced programs and others may be merely beginning. Finally, there is even great variation within schools.

Various programs within the same school well may be, and usually are, at various stages of development. A well developed health occupations Tech-Prep program may bear little similarity to a newly developed hazardous waste materials program. There is no single Tech-Prep program model which adequately describes this immense variation. Therefore, in order to describe the current status of Tech Prep programs In the United States, we have chosen to base these generalizations using the work of Dornsife[76] which describes the various stages of development of operational features of Tech-Prep programs. Dornsife, basing her categories on the earlier work of Hull and Parnell, chose to look at four operational characteristics common to Tech-Prep programs. This section then is devoted to first describing these categories and the various stages of development within each. Finally, we make some generalizations about the current status of Tech-Prep programs using the various stages of development analysis as our basis of comparison.

Operational Features of Tech Prep

Although no single "best" model of Tech-Prep program is appropriate for all consortia, schools and programs, it is useful to describe in some detail the various operational components of Tech Prep programs. As reported by Dornsife, and in concert with others,[77] there are four general operational features that serve as the working foundation for all program. These include: information/marketing campaigns, curriculum development, career guidance, and program improvement. This is not a static list of program features. Tech

Prep is a dynamic educational reform initiative. As programs evolve and the number of activities increase it is likely that additional features will be added. Certain activities such as staff development and business and industry collaboration, will undoubtedly be added to the list as consortia become more advanced and practitioners gain a better understanding of what is expected of their programs. The purpose of this section is to describe how Tech-Prep programs differ on the basis of changing activities and priorities associated with them in the early period of a massive national reform effort.

It is important to note that the activities and priorities associated with the operation of each program feature reflect the outcome of various planning and implementation processes. As a result, program variation is best understood by recognizing the relationship between the components of Tech-Prep programs, the stages of program development, and the organizational structure of program operations. An overview of the stages of development of the operational features of Tech-Prep programs is presented in Table 5.5.

The material in this table describes a logical process that typical Tech-Prep programs progress through. Dornsife categorizes these three stages as: (a) beginning, (b) intermediate, and (c) advanced. Each program does not advance simultaneously from one stage of development to the next. Rather, Tech-Prep initiatives follow a variable course of development, reflecting a mixture of components operating at various stages. A Tech-Prep program can be a combination of (a) beginning marketing campaigns, (b) intermediate course development, (c) beginning career guidance, and (d) intermediate program improvement. A description of each operational feature is presented below.

The descriptions presented below are based on data collected from questionnaires, site visits to secondary and postsecondary institutions, participation in numerous regional and national Tech-Prep conferences, and an extensive review of written materials including: program documents, ERIC files, and academic publications. It is important to note the results from these research activities are preliminary representing only the beginning stages of a rapidly developing and changing program. In fact, based on the results from two recent 50-state surveys, an estimated 850 consortia began planning and implementation efforts in 1991-1992,[78] and over 50 percent of the current programs (n=200) describe themselves as "just getting started."[79] Despite the early developmental stage of Tech Prep, there are some important lessons that can be learned and some important information that will assist later program implementors.

Table 5.5

The Evolution of Tech Prep Programs:
Development Stages of Operational Features

	OPERATIONAL FEATURES			
PROGRAM DEVELOPMENT STAGES	Information/Marketing Campaign	Course Articulation & Curriculum Development	Career Guidance	Program Improvement
Beginning	initiate small-scale "spread the word" campaign	articulation of currently existing individual courses in vocational-technical program areas	establish Career Guidance Center (e.g., rearrange offices, upgrade equipment)	identify outcome indicators (e.g., enrollment figures) and context and process indicators (e.g., student satisfaction with curriculum), establish baselines, and informally collect information
Intermediate	establish a formal/written marketing plan, identify all target audiences, develop and implement a sequence of specific marketing activities	articulation of modified courses, and course sequences in voc-tech program areas	expand career development program at secondary level (grades 7-12)	formalize system for collecting data, review and expand indicators as needed
Advanced	engage in major marketing campaign, wide-spread dissemination of program description and outcomes, expand permanent program activities	articulation of completely new courses, course sequence, and the development of voc-tech and academic core curriculum, and programs that provide training along a career ladder	integrate career development programs to all school levels (grades K-14)	routinely analyze program improvement data, revise components as needed, publish results

Operational Feature #1: Information/Marketing Campaigns

The purpose of information/marketing campaigns is to "spread the word," inform audiences, and promote student enrollment in articulated courses. As Tech-Prep programs evolve and "take root," the purpose of these campaigns includes a focus on larger issues, such as the goals of vocational education, and the relationship between selected course offerings and technical career opportunities. Information campaigns change over time, and vary on the basis of the approach selected for planning and implementation, and the activities selected to constitute the campaign. For instance, a campaign can be carried out by administrators at the postsecondary institution, by personnel in the district office, by a committee or task force, or by an outside specialist hired as a consultant. In addition, the selected marketing activities may be singular or multiple, and may take place during the entire year, or may coincide with specific events during the school-year.

Stage One: Beginning Programs

Information campaigns are often initiated by postsecondary personnel who are responsible for planning and implementing articulation agreements. At the beginning stage of program development a variety of promotional items and/or printed materials are prepared. At this stage, the target audience is often limited to secondary and postsecondary students and staff, and the material is distributed during regularly scheduled school events and in highly visible locations (e.g., during course registration, and in the career development center).

Stage Two: Intermediate Programs

As the availability and purpose of tech prep programs becomes more familiar to students, faculty and counselors, the scope of the marketing campaign is expanded. In general, during the intermediate stage of program development, the purpose of the marketing campaign is to provide *more* information to *more* audiences. For instance, new or revised program brochures are printed, and the number of target audiences are increased to include parents, business representatives, and members of the community at large.

Stage Three: Advanced Programs

At the advanced stage of program development several marketing campaign activities are well in place, many ongoing activities are revised or regularly updated, and other new activities are added. For instance, the number of campus tours or the content of demonstrations may change as more students become interested in tech prep programs, or as new equipment is acquired.

It is at this stage of program development that some programs incorporate the use of a videotape to market Tech Prep. Finally, at the advanced stage of program development, some programs have instituted rather ambitious activities such as statewide inservice workshops, or regional conferences. For example, during the 1990-91 academic year the Chancellors Office of the California Community College and the California State Department of Education funded a series of 15 demonstration workshops presented at five sites throughout the state.

The outcomes of a marketing campaign are dependent upon several factors (commitment, resources, etc.). The most important factor, however, is a well developed and defined Tech-Prep program. Information can be disseminated in professionally designed brochures, but if textbooks and equipment are not in place and courses cannot be taught, Tech-Prep programs lose credibility. In addition, when textbooks fall to arrive and lab equipment is not ordered, teachers are forced to be innovative, students are denied the full impact of the course, and these negative outcomes can lead to negative attitudes. Finally, if parents and counselors do not perceive the advantages of Tech-Prep programs they cannot recommend these programs to their children or students. In short, planning oversights can result in inadequate and poorly developed programs that no amount of marketing can overcome.

Operational Feature #2: Curriculum Development

At the heart of Tech-Prep programs is the development of articulated curriculum between secondary and postsecondary institutions. As indicated in Section III (articulation), there is widespread agreement on a definition of articulation, and the processes for developing articulated curriculum, but there remain several variations in actual practice. In short, while most schools follow the same steps for articulating Tech-Prep curriculum the result is not always the development of similar programs. Given these variations, the material below provides a discussion of some current curriculum variations.

Stage One: Beginning Programs - Articulating Currently Existing Courses

Given the potential difficulties in planning and implementing Tech Prep most schools begin by choosing the path of least resistance by articulating similar courses currently available. At this beginning stage of development, the primary objective is to articulate curriculum that prevents duplication of coursework, and shortens the time for secondary students to complete a postsecondary program. However, the potential limitation of articulating currently available courses is that the hard work may need to be repeated. Given the costs and logistical difficulty in bringing high school and community college instructors together and designing articulated programs, quality, long-term planning is essential.

Stage Two: Intermediate Programs - Modify Courses

A second approach to curriculum articulation is to modify the content of existing courses, and to articulate a sequence of secondary courses in one or more vocational-technical program areas. In most secondary and postsecondary institutions, course modifications consist of integrating new occupation-related information and skills. This integration can take the form of using new textbooks, new and different computerized material (e.g., word-processing packages), or new equipment and machinery (e.g., computerized milling machines).

Beyond these course changes, the most common form of curriculum modification for Tech-Prep programs is the adoption of competency-based approaches to coursework. In fact, in some states this is a legislative mandate (e.g., Oregon). In addition, most secondary schools use competency-based curriculum to offer students a sequence of courses in one or more vocational-technical program areas. In most cases, each course in the sequence is articulated with a postsecondary institution, and the student can earn either advanced placement or gain advanced skill competencies.

The major barrier to full scale implementation of this approach to curriculum development is the difficulty in gaining sufficient resources to provide opportunities for teacher collaboration. These incentives include the allocation of release time and additional remuneration, or hiring technical consultants to help refine competency-based curriculum. Furthermore, an over-reliance on competency-based curriculum can result in teachers teaching to a list of competencies and job tasks.[80]

Stage Three: Advanced Programs - Articulating New Courses, Course Sequences, and Developing Core Curriculum

The third approach to developing Tech-Prep curriculum is to articulate new courses, as well as course sequences, and to develop academic and vocational-technical core curriculum designed to provide training along a career ladder. In some schools, this third approach to developing curriculum is the result of direction provided by state initiatives or legislative mandates.

Applied Academic Courses

In the case of Tech Prep, the articulation of new courses is almost synonymous with the integration of "applied academic courses" into a core curriculum for vocational-technical programs. These courses emphasize the acquisition of academic principles and concepts through classroom and laboratory activities that connect abstract knowledge to workplace applications. In general, schools

math, science, and English. Most importantly, the articulation of these courses is a relatively new phenomenon.

Examples of Tech-Prep Course Sequences and Core Curriculum

The advantage of using applied academic courses is that they can serve as a coherent sequence of core courses linked to a sequence of recommended or required vocational courses. This linkage is a major objective of Tech Prep programs, and provides the student with a clear educational plan to meet his or her occupational goals. Two examples of these linkages are described below.

An example of Tech-Prep curriculum that includes applied academic courses is the 2+2 articulated sequence of classes offered at the Community College of Rhode Island (CCRI, Warwick, Rhode Island). For instance, a CORI student who is interested in engineering technology would, first, complete a required core sequence of science, English, and math courses in high school. These core courses would include Principles of Technology, Applied Communications, and Applied Math. Or, depending on the program area, the student must complete the following math courses: algebra I (Computer Science), algebra II (Engineering), or algebra I and geometry I.

Then, students who successfully complete these secondary courses are guaranteed acceptance into the CCRI technical programs if they meet the following criteria:

(1) a grade of C or better in Principles of Technology I and II,
(2) a grade of C or better in English grades 11 and 12,
(3) a grade of C or better in the math course that meets the program requirements, and
(4) proficiency on the CCRI English and Math Placement.[81]

A second example of an articulated sequence of classes is the Tech-Prep programs at Portland Community College and Hillsboro Union High School (Portland, Oregon). A student interested in business administration occupations (accounting) completes a sequence of coursework that includes academic courses required for graduation and recommended vocational (business) and academic courses to be taken during the junior and senior years (e.g. accounting I, computer applications for business, and algebra I). In the process the student can earn community college credit in 8 of the 12 recommended courses. In turn, if the student continues in the associate degree accounting program, he or she can earn transfer credit to a 4-year college in 18 of the 27 courses required for graduation.

Training Along a Career Ladder

In the examples just described the Tech-Prep curriculum is presented as a coherent sequence of *academic courses* linked with a sequence of *vocational-technical* courses. This sequencing provides students with a clear educational plan, and, in many technical program areas, it provides the student with "multiple exits," or training along a "career ladder." For example, the accounting course sequence at Hillsboro Union High School is designed to provide the student with entry-level skills needed for immediate employment, or for continuing in an accounting program at a postsecondary institution such as Portland Community College.

Developing New Courses and, Curriculum with Business and Industry

In several cases, the development of Tech-Prep curriculum at the advanced stage of program development is the result of collaborative efforts with business and industry representatives. Their direct input typically includes suggestions for revising existing curriculum associated with the routine upgrading of local jobs (e.g., integrating widely used computer packages into the curriculum of business, administrative, and drafting courses). In some cases, however, the input from business and industry is required for the development of new courses to provide training for new or changing employment needs in the community (e.g., the development of Tech Prep in hazardous waste materials technology).

Conclusion of Curriculum Development

There is widespread agreement among educators and Tech-Prep supporters that sequence of academic courses linked with a sequence of vocational-technical courses. Although the courses may vary, the purpose of creating the linkage is to offer students a program designed to provide the acquisition of skills and training for employment or for postsecondary education. As the examples in this section indicate, the required core of academic courses can include applied academic courses, or standard college prep courses. This core is linked to a sequence of two or more courses in a specific vocational-technical program area, and these courses are typically articulated with a postsecondary institution. Furthermore, the vocational-technical course offerings in most schools reflect current employment opportunities in the community and the changing labor needs of local, regional, or national business and industry enterprises.

Operational Feature #3: Career Guidance

The third operational feature of Tech-Prep programs is career guidance. The purpose of the guidance feature is to prepare a sequence of support activities

designed to help students plan and develop career options. Guidance is an important function. Students want more opportunity to work on career development, parents want more information on what schools are doing to promote career development, and policy makers want more cost-effective educational programs. Guidance activities serve a supportive role for vocational education programs such as Tech Prep because the sequencing of career development activities helps students gain an understanding of the relationship between school and work.

Stage One: Beginning Programs

In school districts that support a new approach to guidance programs, the first and most common form of change is to reorganize the physical space and up-grade the equipment in the facilities. In short, a guidance center is created and then a sequence of activities is planned and implemented. The center is centrally located and provides a collection of up-to-date print and nonprint career information. This information is disseminated through various activities for improving grade-level career awareness and increased opportunities for career exploration.

Stage Two: Intermediate Programs

At the intermediate stage of developing a career guidance program, most secondary schools expand their sequence of activities to include students in grades 7 and 8. For instance, the staff at Richmond High School expanded its guidance activities to include the requirement that all eighth grade students complete a "Career Plan Form." This form is included in the students Career Planning Folder and indicates what course of study and corresponding classes the student has selected.

Stage Three: Advanced Programs

At the advanced stage of program development the guidance component typically includes a sequence of activities across all grade levels, K-14. To date, no tech prep Program has completed this process. However, there are some programs that have integrated guidance programs between secondary and postsecondary levels, and between secondary and elementary grade levels. For instance, Leander Independent School District and Austin Community College (Austin, Texas) include a mentoring program for students in grades 10 through 14, the Community College of Rhode Island includes a mentoring program for students in grades 11 through 14, and, in 1990-91 Richmond County Schools introduced career exploration activities for students in grades K through 6. Specifically, the guidance staff are established a career competency profile for each student and helped them explore the development of life skills needed for the world of work.

To meet the needs of students, parents, and policy makers, the guidance activities for Tech Prep are designed to promote student development at both the secondary and postsecondary level. In most schools, the implementation of these activities requires a redefinition of guidance at the secondary level. Instead of an ancillary department or a series of fragmented and event-oriented activities (e.g., a self-esteem workshop or a career day), the guidance program is restructured into an organized sequence of activities designed to help students learn how to plan and develop their career.

The actual selection of guidance activities is unique to each school. However, at the early stage of Tech-Prep development nationwide, there are few detailed examples of developing or developed guidance programs coordinated with Tech Prep. The lack of concrete examples is not the result of disagreement over the importance of guidance, but, instead, the result of limited program funding. The development of a comprehensive guidance program for Tech Prep requires financial resources and staff commitments that many schools do not have. As a result of these limitations, the necessary guidance activities tend to develop at a slightly slower pace than the other operational features.[82]

Operational Feature #4: Program Evaluation

The fourth operational feature of Tech-Prep initiatives is program evaluation. It too is a dynamic process. Given the nature of this process, and because most programs have only been operational for one to three years, there is a limited amount of published material describing current evaluation efforts. In fact, most administrators believe it takes five to seven years of operation before a comprehensive evaluation can be conducted and any major program improvements instituted.[83, 84] Furthermore, during the first year of operation most administrators collect information for evaluation purposes through informal means (e.g., telephone calls, unscheduled meetings. etc.). In turn, there is a limited amount of published data, and restricted access to any information contained in school records.[85]

In most cases, the community college assumes primary responsibility for conducting a program evaluation, publishing the results, and initiating program improvements. Secondary school personnel participate in these efforts; however, their participation is often limited by the form and content of data they can provide. For instance, most secondary schools do not have the financial or personnel resources to maintain a complete academic and career development profile on all students in Tech-Prep programs, or to collect feedback from community members after they attend school events, such as parents night or an open house. Despite these limitations, a thorough evaluation of Tech-Prep programs includes the participation of all "stakeholders" (e.g., counselors, students, employers), particularly the collaborating secondary and postsecondary institutions.

The overall purpose of evaluating Tech-Prep programs is twofold. First, evaluation data is collected to meet the concerns of practitioners and other "stakeholders," and to provide useful information for making decisions on program enhancements. Second, data is collected to meet the concerns of management audiences, and to fulfill the legislative requirements of the state accountability system. In an attempt to achieve both objectives, school personnel answer the following sets of questions: (a) Those related to outcomes: Who is served, what is offered, what is accomplished, and what does it cost? and, (b) Those related to process and context: To what extent was the project plan implemented? How and for what reasons did it have to be modified? What needs were addressed? To what extent were objectives reflected in assessed needs?

Outcome Indicators

To fulfill program accountability requirements, all postsecondary institutions collect data on outcome indicators, such as percentage of course enrollments, program competitions, and job placements. As mentioned earlier, most Tech-Prep programs have not been in place long enough to provide completion and placement data for graduates so the most widely reported outcomes are the number of articulated classes, and the number of students enrolled in these classes. Enrollment figures are available from secondary and postsecondary schools; however, postsecondary institutions typically provide a record of the number of students enrolled in articulated classes.

Context and Process Indicators

Ideally, program improvement decisions are made after considering data from several outcome measures (e.g, job placement rates, student satisfaction with the curriculum), and determining the effectiveness of each program component (e.g., career counseling). Furthermore, data is collected by conducting both formative (before and during) and summative (at the end) evaluations. For instance, a common practice in some Tech-Prep programs is for administrators to evaluate the actual planning process before and during program implementation. The purpose of these evaluations is to establish a record of how the various participants ("stakeholders") define program objectives and perceive their role in achieving these objectives. In addition, this information provides an understanding of the historical context, and a means of evaluating future responses to questions such as "to what extent was the project plan implemented, and objectives achieved?"

Stage One: Beginning Programs

In the beginning of Tech-Prep programs, the focus of many program improvement efforts is on understanding the process of articulation (context

and process indicators), and reporting the number of articulated classes/agreements (outcome indicators). For instance, a three year project for establishing Tech-Prep programs at Fresno City College (FCC) began with a year long examination of how to develop a process for establishing articulation agreements.

Stage Two: Intermediate Programs

At the intermediate stage of program development most administrators broaden the collection of discrete outcome measures, and systematically collect this information in anticipation of comprehensive program evaluations and potential program improvements. For instance, each year, the annual report from Portland Community College includes a summary report from each program subcommittee, including: demonstration projects, program continuance/improvement, staff development, forecasting and advising, marketing and communications, new avenues for articulation and partnerships, strategic planning, and student tracking. Although these are brief summaries, the descriptive information on process indicators provides an additional basis for determining program "success."

Stage Three: Advanced Programs

At the advanced stage of program development, most administrators have identified a specific number of outcome indicators, established a formal process of data collection, and routinely published the results (e.g., annual reports). In some cases these efforts have led to the adoption of a computerized tracking system for upgrading articulation records, and, eventually, for identifying students by their declared "Tech-Prep major."

Conclusion of Program Evaluations

The information gained from program evaluations is used to ensure quality and provide direction. New program areas can be developed (hazardous materials technology), others terminated, and some modified (adding computer-assisted instructional units to a nursing curriculum). The results of program evaluations also provide a basis for making decisions on equipment acquisition and facility remodeling, such as adding computers and computer-aided design software to a drafting program. Finally, evaluations may highlight program deficiencies. For instance, poor job placement within a specific program may not be curriculum based, but because students are not knowledgeable about the job placement services.

Summary of Stages of Development

In sum, based on data collected from questionnaires, site visits to secondary and postsecondary institutions, participation in numerous regional and national Tech-Prep conferences, and an extensive review of written materials including program documents, ERIC files and academic publications, we find that consortia are almost all at the beginning stages of development in the four operational components we examined. However, progress is not uniform. From our perspective, consortia are moving more successfully from beginner to intermediate status in curriculum development and information campaigns. Typically, since articulation is at the heart of Tech Prep, districts first concentrate on those things that need to be articulated -- courses. They appear to be making steady progress in moving along the continuum to more advanced forms of curriculum development into course modification and program articulation efforts. The same appears to be true of information efforts. Consortia are beginning to expand the audience to whom they address Tech-Prep materials and the materials themselves are developed in a further, more detailed manner.

Consortia appear to be making less progress in moving their activities in Guidance and Evaluation from the beginning to the intermediate stage. There are almost no programs which have attained advanced status. In fact, in terms of development these two operational features clearly deserve some attention. Major barriers to program enhancement in these two areas appear to be cost and lack of effective models.

6. CONCLUSION

Because the implementation of Tech Prep, a complicated new vocational education initiative, is only in its infancy, it is much too early to suggest definitive conclusions regarding the status of these programs. However, our research results can provide tentative answers to several key questions of most interest to policy makers regarding program status. These central questions include: (a) Are planned or operating Tech-Prep programs consistent with the spirit of Perkins II? (b) To what extent are sites performing essential implementation functions? (c) Is there a serious commitment to Tech Prep? For instance, are key leaders participating in program planning and implementation? (d) What activities support or hinder the development of Tech-Prep programs?

Before addressing the central questions asked by policy makers, an abbreviated review of our principle findings regarding program implementation is in order. We emphasized throughout this review that most programs were just beginning and conclusions about the success or failure of Tech Prep were not warranted at this early date. In Section Two, we identified the key definitions

and essential features of Tech Prep. In Sections Three, Four, and Five, we examined the status and stages of development of these new programs. We have combined these findings below.

First, we identified the five key definitional components of Tech-Prep programs. They include (a) articulation; (b) integration of academic and vocational education; (c) connection between school and work; (d) development of core curriculum and course sequencing; and (e) emphasis on learner outcomes. On each of these dimensions we found that the bulk of Tech-Prep programs had adopted the strategy of least resistance, i.e. for the most part, only the simplest form of reform.

In articulation most of the programs had built on their past experience and were still viewing articulation on an individual course-by-course basis. Tech-Prep articulation requires a more sophisticated form of articulation which emphasizes articulation of programs. Further, Tech-Prep articulation assumes that the end result will lead to the attainment of advanced skills by program participants. Most programs were still emphasizing advanced credit and had not yet evolved to an emphasis on advanced skills. Similarly, we found that most Tech-Prep programs had adopted only the most rudimentary integration of academic and vocational education components. Only a handful of programs had evolved to the stage of the most sophisticated integration models which assume that at both the high school and community college levels both academic and vocational courses will be altered to reflect the new emphasis on integration.

While a larger number had adopted applied academics course material, few consortia had integrated materials across the segments. In fact, very little postsecondary integration had even taken place. On the dimension of connecting school and work, many programs were just beginning to gain real partnership arrangements with the business and labor community. Few partnerships with business involvement at every stage of program development from planning through implementation were evident. The development of core curricula was also a dimension of these programs that was only at its initial implementation stage. Almost no programs had adopted a fully developed core curriculum intended for all students as envisioned by Parnell. Finally, few consortia had adopted outcome oriented programs.

Second, we turned to the analysis of planning and implementation, we identify specific legislative requirements that must be addressed for full implementation of Tech Prep. These include (a) articulation agreements, (b) 2+2 articulated Tech Prep curriculum, (c) in-service training for teachers conducted jointly with other institutional participants in the consortium, (d) training for counselors, (e) equal access for members of special populations, and 6) preparatory services for all participants. Bragg[86] and Layton and

Bragg[87] indicate that state and local educational agencies fall short of addressing all of these components, particularly in areas such as equal access and preparatory services for all participants.

Further, as we look at the stages of development analyses, a similar pattern emerges consortia still in the early stages of adoption. On the dimension of information development, consortia generally were moving from the beginning to the intermediate stages. The same could be said for curriculum development as consortia were beginning to implement some of the features outlined in the intermediate stage. On the other two dimensions however, a less optimistic picture is warranted. Most consortia had as yet done little to implement strong programs with business and industry and even fewer had adopted significant evaluation measures.

All in all, one might be inclined to look at these results with disappointment. However, in our view, that would be an ill-advised conclusion. These results are precisely what one would expect from a very new, very complex education reform initiative. In fact the Congress, in establishing the Tech-Prep Education Act, placed a strong emphasis on technical assistance in order that programs might properly focus on building a strong foundation. Additionally, the Act authorizes the use of Tech-Prep allocations for planning as well as implementation. The number of comprehensive Tech-Prep programs is small but steadily growing. The current mall number of advanced programs is to be expected since program administrators report that it takes five or six years to develop sophisticated programs.[88, 89] In sum, the lack of large numbers of fully developed programs appears to be a function of the early stages of development, the large number of components (not all of which can be implemented simultaneously), the costs involved (which the federal grants do not fully cover), and the fact that the Congress was purposefully vague about the actual implementation features.

Given these tentative findings, let us now turn to the questions policy makers are most likely to ask:

(1) Are planned or operating Tech Prep programs consistent with the spirit of Perkins II?

We think so. Results from the 30-state survey reveal that "Nearly all the states described the primary driving force behind their tech prep policy was support of the federal Perkins II legislation." Furthermore, a review of the printed program brochures found that program descriptions are much in tune with the intent of the Perkins II language. Such phrases as: "to ensure better transition of youth from school-to-work," "to provide applied academics and employability skills," and "to provide a comprehensive career preparation program that begins earlier than high school," permeate the information

distributed by programs and reflect the intent of the Congress as expressed in Perkins II. Finally and most importantly, our overall impression is that states and sites are deeply concerned about both what to do and how to do it. The intense interest in obtaining current materials about Tech-Prep programs, the growing number and often beyond-capacity attendance at national and regional conferences on Tech Prep, legislative initiatives in several states, the rapidly growing demand on exemplary sites to provide advice, materials and opportunities for site visits all argue persuasively for the position that the spirit of Perkins II has not been lost on the participants.

(2) To what extent are sites performing essential implementation functions?

Since nearly 82% of all grants awarded by the states in 1992 were for planning, our answer is based upon reported or observed activities associated with the limited number of programs where we conducted site visits. Based on these data, we found, for instance, widespread application of the "10 principles for successful articulation," first described in research by Doty,[90] Warmbrod and Long,[91] and McKinney et al.[92] These principles include such steps as: gain commitment from executive-level administrators, designate an individual to take responsibility for the articulated program at each participating institution, involve key personnel (e.g., administrators, faculty, and counselors) from each participating institution. In addition, Bragg[93] found all eight sites she studies used a similar sequence of activities beginning with goal setting, continuing with planning activities within and across institutions, and eventually reaching implementation. While not all areas of the legislatively mandated function receive adequate treatment, virtually all consortia are addressing articulation agreements, curriculum development and inservice training for teachers and counselors. Although most programs are at an early developmental stage, progress is being made on a number of dimensions that persuade us that key issues are being addressed.

(3) Is there a serious commitment to tech prep? For instance, are key leaders participating in program planning and implementation?

The definition and selection of key leaders varies from site to site and reflects the fact that tech prep is typically a locally-defined initiative. For instance, at several nationally recognized exemplary sites (e.g., Richmond County, PAVTEC) tech prep programs were initiated at a limited number of sites (1 high school, I community college, 1-4 local employers) by a discrete number of individuals (community college president and school district superintendent, high school principal and community college instructional dean). Bragg also found at her eight sites that top leaders were involved in executive teams and steering committees to endorse the concept, but typically were not in day-to-day implementation. At other sites, such as those in the States of

Wisconsin, New York, Pennsylvania, and Indiana, legislation has been enacted to require the establishment of Tech Prep. On this dimension of commitment, the preliminary results are simply too variable to draw any kind of definitive conclusion. The best one could say is that in some states and in some districts Tech Prep is a high priority program. But one could just as readily point to examples of states and regions in which Tech Prep does not appear on the school reform radar screen. The ultimate test of commitment will be to see, over time, if states are willing to commit their own resources to providing those necessary to fully implement programs over a larger number of participants than now exist.

(4) What activities support or hinder the development of Tech Prep?

As Bragg noted, a number of factors that influence Tech-Prep planning and implementation were identified through data collection with the 50 states and subsequent site visits. These factors include such items as clarity of purpose, leadership development, and control of funding. In fact many planners reported struggling with reaching consensus on the following issues: the purpose of tech prep, the target student audience, the outcomes, program components, and how implementation should be conducted.

An analysis of information from various exemplary programs also indicates current and future program "success" begins with a strong operating base. In short, using a well-developed planning process contributes to reaching desired program outcomes. We might also draw this conclusion by examining the outcome data these programs provide, such as the articulation summaries. At first glance, presenting these summaries implies that the purpose of tech prep programs is for postsecondary institutions to amass articulation credits. However, the program coordinators at these sites report that major curriculum changes (developing advanced skills Tech Prep) all begin by establishing course- by-course articulation agreements. The logic behind this approach to curriculum articulation is that currently enrolled students are served now, This structure establishes a foundation for the development of advanced-skills programs.

The primary barriers to tech prep are vulnerability to funding cuts, personnel losses, and the results of inadequate long-term planning. Like all major reform movements, tech prep programs may fall victim to impatient and/or misinformed audiences. As usual, on the one hand, it takes time to make curriculum changes, establish and build partnerships, train staff, develop promotional materials, and acquire one generation of graduates to inform the next. On the other hand, current program directors and staff need to establish "local ownership of the program" and not rely solely on federal funding for program operations.

Perhaps an area of greatest weakness is that of program evaluation, an outgrowth of a lack of investment in long-term planning. As presented earlier, most Tech-Prep programs can be categorized as "just beginning," thus program evaluations should be in the initial planning stages. Although evaluation plans are being developed, it cannot be assumed that the most relevant program performance indicators will be incorporated, including measures for all components and stakeholder groups.

Finally, successful workforce preparation programs are those that reflect an understanding of the local economy, labor market, and local population needs. Hence, in the process of developing their plan all stakeholders must grapple with the question of how and if their Tech-Prep programs will prepare students for local, regional, state, or national jobs. If Tech-Prep programs are being promoted as preparation for high-tech, high-skill technical jobs, and these do not exist in the surrounding community, what is the result? To date, consortia have tended to move ahead in program development without paying adequate attention to labor market needs. At some point, earlier we hope, consortia must pay closer attention to the nexus between these Tech-Prep programs and the economic development issues in the communities in which they are found.

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CHAPTER 6

PERFORMANCE STANDARDS AND MEASURES

Brian Stecher, Hilary Farris, and Eric Hamilton

INTRODUCTION

The National Assessment of Vocational Education's 1992 Omnibus Surveys provide a snapshot of state and local agencies in the process of developing statewide systems of standards and measures of performance. Such systems were mandated by the 1990 Perkins Act, which envisions an accountability system built around outcomes, measures, and standards. Outcomes are student- and program-level accomplishments, including the mastery of academic and occupational skills, the completion of programs, and employment. Measures are ways of quantifying the attainment of outcomes, such as written examinations, scored performance exercises, and rates of placement. Standards are targets of acceptable performance on each measure, including both absolute levels ("greater than 75 percent of students") and rates of improvement over time. The Perkins Act requires states to adopt a common set of standards and measures of performance to serve as a framework for evaluating and improving vocational education programs.

Although the legislation was enacted in 1990, states were given two years to prepare for changes in accountability; they were not required to implement systems of standards and measures until fall of 1992.[1] When the Omnibus Surveys were distributed in the spring of 1992, most states were still in the process of developing their plans. Many had not yet decided which measures to use, nor had they set standards for performance.

As a result, many of the questions in the surveys covered multiple time periods. Respondents were asked to describe their efforts prior to the survey (before school year 1991-92), at the time of the survey (during school year 1991-92), and subsequent to the survey (their intentions for 1992-93 when final standards would be in place).

This chapter is divided into three sections. The first focuses on the process of implementation. The second analyzes the **nature** of the changes that states, districts, and schools were making as they adopted performance measures and standards. The final section draws together our conclusions for the broad questions of vocational education policy.

THE PROCESS OF IMPLEMENTING STANDARDS AND MEASURES OF PERFORMANCE

This section uses Omnibus Survey data to address four questions about the process of implementation:

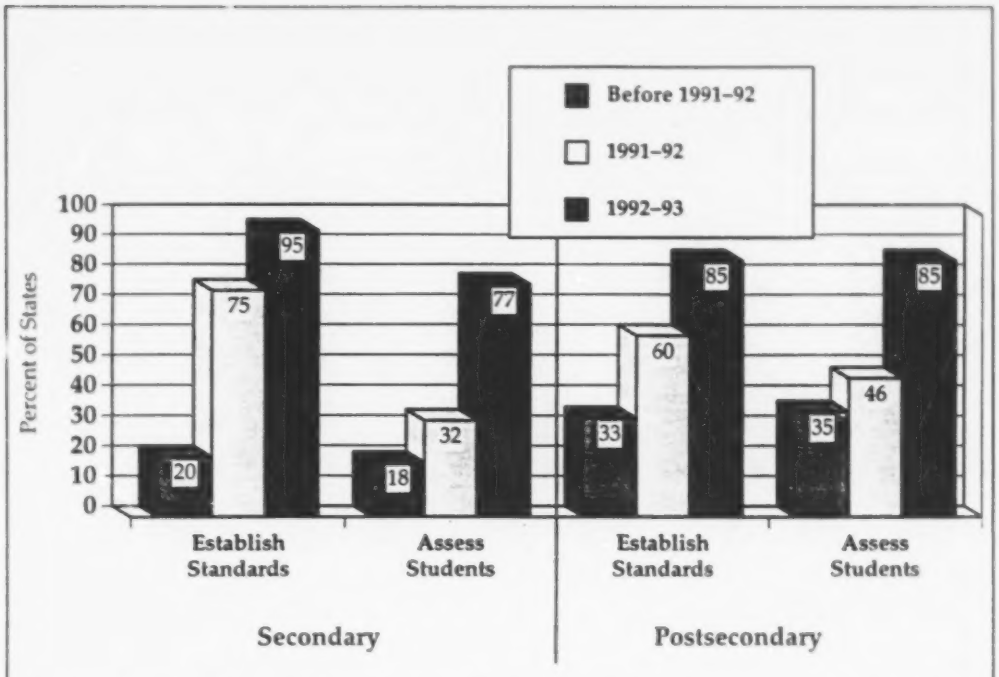
- Were the states responsive to the Perkins requirements for establishing standards and measures?
- How much attention was paid to implementing standards and measures at the local level?
- What kinds of states were most active in establishing standards and measures?
- What groups were most heavily involved in developing state standards and measures?

State Progress

The survey data show that states were responsive to the Perkins requirements. By Spring 1992, virtually all states were in the process of developing performance standards. Eighty-five percent or more of state secondary and postsecondary agencies reported that they planned to establish performance standards for vocational education by the end of the 1992-93 school year. Over three-quarters of the states were assessing, or planned to assess, secondary student performance based on these standards; before 1991-92, only 18 percent of the states did so. At the postsecondary level, 85 percent of the states expected to use standards-based student assessment by 1992-93, up from 35 percent in 1991-92. (See Figure 6.1)

The increased use of standards-based assessment could be one of the most significant Perkins-inspired changes in state accountability practices. However, there is a significant gap between what states planned for 1992-93 and what was accomplished by the end of 1991-92. It is possible that in providing the survey data, states were overly optimistic about meeting Perkins requirements in the following year (see Appendix Tables A-6.1 and A-6.2).

The Perkins Act has clearly encouraged states not only to develop performance standards but to pay more attention to the types of measures they use, or will use, to monitor statewide performance. By the end of the 1992-93 school year, 85 to 95 percent of state secondary and postsecondary agencies planned to have engaged in the process of selecting and/or developing performance measures.



Source: Omnibus Surveys of Secondary and Postsecondary State Agencies

Figure 6.1. Steps in implementing standards.

Moreover, by the end of the 1991-92 school year, more than two-thirds of secondary and postsecondary state agencies were developing new performance measures, rather than simply adjusting or recycling measures that had already been in use. In contrast, before 1991-92 only one-third of the states were involved in developing new performance measures (see Appendix Tables A-6.1 and A-6.2).

This increase in state performance assessment activity placed an increased burden on state officials. Nearly 80 percent of the states reported that secondary and postsecondary vocational education staff had more responsibilities for developing measures of student performance than they did in 1990.

Local Implementation

While states made a strong commitment to developing statewide standards and measures, implementation had not begun in earnest at the time of the survey. Presumably for this reason, responses from secondary school districts (both regular and vocational) indicated no increase in attention to

implementing vocational performance standards and measures at the local level.

Less than one-third of the surveyed school districts, regular and vocational, reported any increase in state assistance with assessment or accountability. On a similar question, only 40 percent of the regular secondary districts and one-half of the vocational districts said there had been any increase in state support for vocational program assessment and accountability since the previous school year.

Many districts were comfortable with this level of effort. Slightly less than one-half of the regular school districts and 62 percent of vocational school districts felt that state support for vocational program assessment and accountability was very good or adequate.

While implementing new statewide performance measures and standards in vocational education is likely to affect teachers, at the time of the survey few had yet received any training relating to performance assessment. In 1991-92, less than 20 percent of vocational and regular districts reported any state-sponsored in-service programs on "student assessment/performance evaluation" for vocational education teachers. States were much more likely to have sponsored reform-oriented in-services on topics such as the integration of vocational and academic education, tech prep, and services for special needs students. One-quarter of regular school districts and one-third of vocational districts sponsored their own in-service on student assessment (see Figure 6.2).

With little or no state guidance, most school districts and postsecondary institutions seemed to be waiting to see how their state's plan would affect them. Only 11 percent of regular school districts used 1991-92 Perkins Title II basic grant funds to develop or expand vocational performance assessment systems; slightly more than one-quarter of all vocational districts used Title II funds for this purpose. In both types of districts, performance assessment was among the rarest funding choices. Only 19 percent of postsecondary institutions used 1991-92 Perkins Title II basic grant funds to develop or expand vocational performance assessment systems; once again assessment was among the least frequently funded activities (see Appendix Tables A-6.3 and A-6.4)

Responses to other questions also indicated that the influence of state standards and measures at the secondary school level was limited. One-half of the secondary schools reported no change in assessment and accountability efforts over the previous year; 41 percent reported a moderate increase in such efforts and 8 percent a large increase. The majority of high schools experienced no change in district support for vocational program assessment

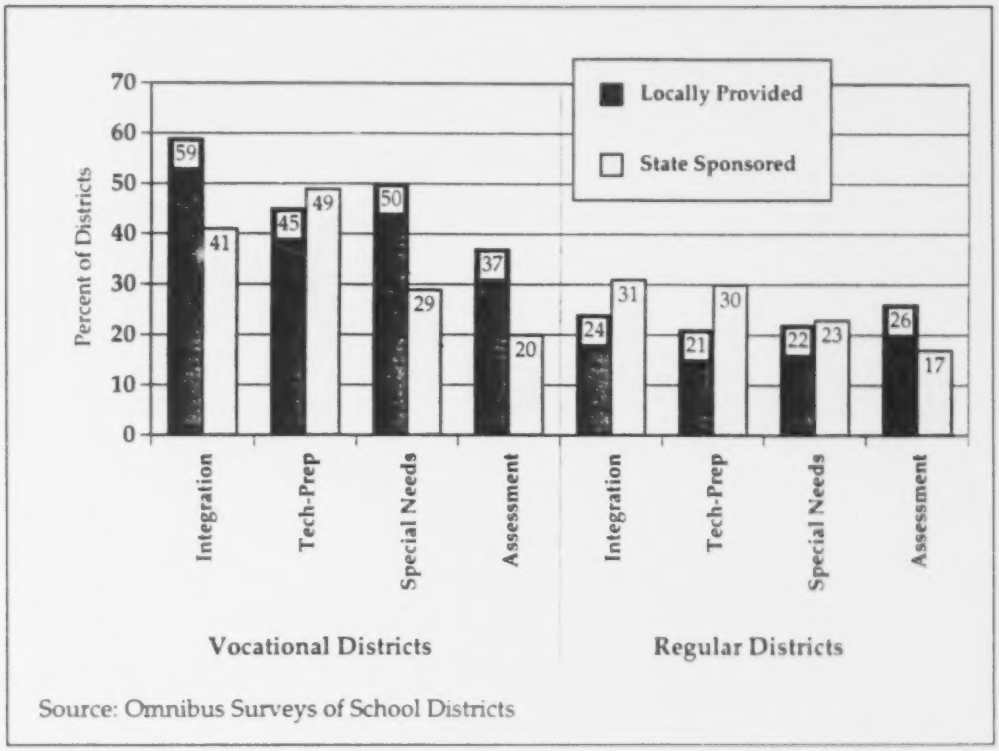


Figure 6.2. District in-Service topics.

and accountability, but 40 percent did a report a moderate or large increase (see Figure 6.3).

Adoption Patterns

In addition to requiring the implementation of statewide systems of performance standards and measures, the Perkins Act also required states to move forward with other reforms such as integrating academic and vocational programs, developing tech-prep programs, and providing services to special populations. At the secondary level states appeared to adopt these Perkins-related reforms as a package, rather than one at a time.

States that were more aggressive in promoting integration of academic and vocational education also tended to begin developing and using performance standards and measures at the secondary level earlier than less aggressive states.[2] The most aggressive promoters of academic/vocational integration were eight times more likely to have assessed student performance, using standards at the secondary level in 1991-92, than the least active integrators (54% to 7% respectively). In other words, states that had done more with integration at the secondary level were doing more with performance

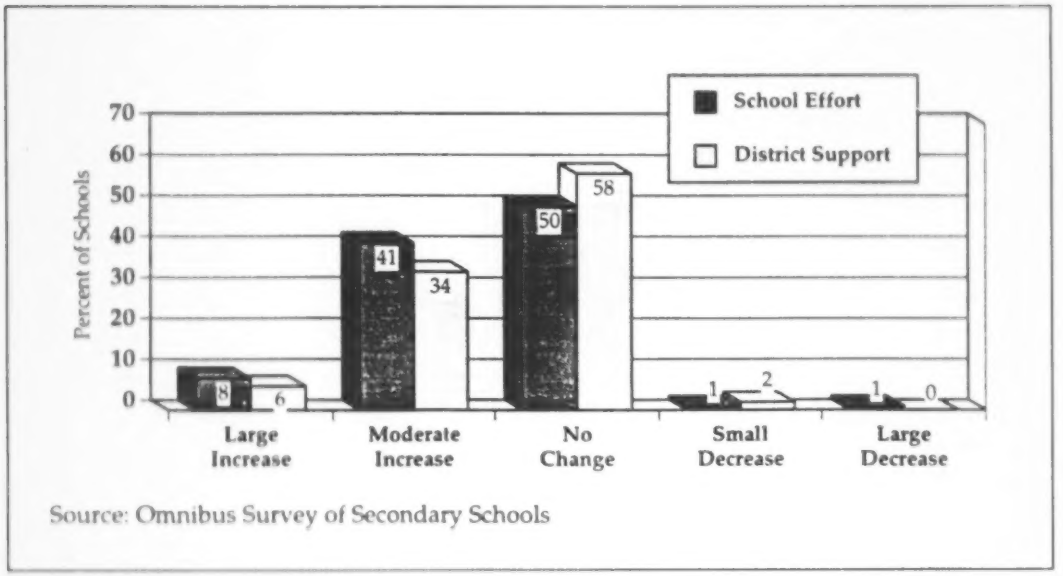


Figure 6.3. Changes in district support for assessment and accountability, 1990-91 to 1991-92.

standards and measures. While there is some evidence of a similar relationship at the postsecondary level, the association is weaker.

Some evidence suggests that states with higher public expenditures for vocational education also were more active in implementing performance standards and measures at the secondary level. However, this relationship was not as strong, and the pattern was not consistent in the secondary and postsecondary data.

Key Players

The most important groups in developing statewide systems of standards and measures are state and local vocational education administrators and staff. State vocational education officials, school administrators, and local vocational education administrators and staff played regular or major roles in developing standards and measures in more than 70 percent of the states, at both secondary and postsecondary levels. Special population representatives were the only "outsiders" involved to this degree in the development process.

At the secondary level, employer representatives, parents, and students were consulted, at least once or twice, in 80 to 90 percent of the states. These same groups were involved much less often at the postsecondary level. Union representatives were involved in some way at the secondary level in two-

thirds of the states. However, they were involved at the postsecondary level in just under one-half of all states (see Appendix Table A-6.5).

In most cases there was no relationship between the groups involved in the process of developing performance measures and standards and either the level of state expenditures on vocational education or the state's aggressiveness in promoting integration of academic and vocational education. The only exception was the participation of state legislators. At both secondary and postsecondary levels, states that had done more to promote vocational/academic integration were also more likely to at least occasionally consult state legislators or staff in this process.

As one might expect, local school officials appeared to know little about who was involved in developing statewide performance measures and standards. The survey response rate was very low when district officials and post-secondary institution representatives were asked about the involvement of local groups in the **state** standards and measures developing process.

District officials were much more knowledgeable about the input of various groups in the process of developing their own **local** plan. Vocational school districts were much more likely than regular school districts in involve parents, employers, trade unions, and representatives of special populations in developing their local plan. None of these groups were involved in even one-half of the regular school districts. Parents, employers, and special population representatives were involved in local plan development in more than 50 percent of the vocational school districts (see Figure 6.4).

THE NATURE OF THE NEW STANDARDS AND MEASURES OF PERFORMANCE

The Omnibus Survey data provided evidence about the nature of states' intentions regarding statewide standards and measures. The survey assembled information to answer three questions:

- What types of performance measures and standards were adopted?
- Which groups of students were to be included in statewide systems?
- How do new measures and standards compare with past practices?

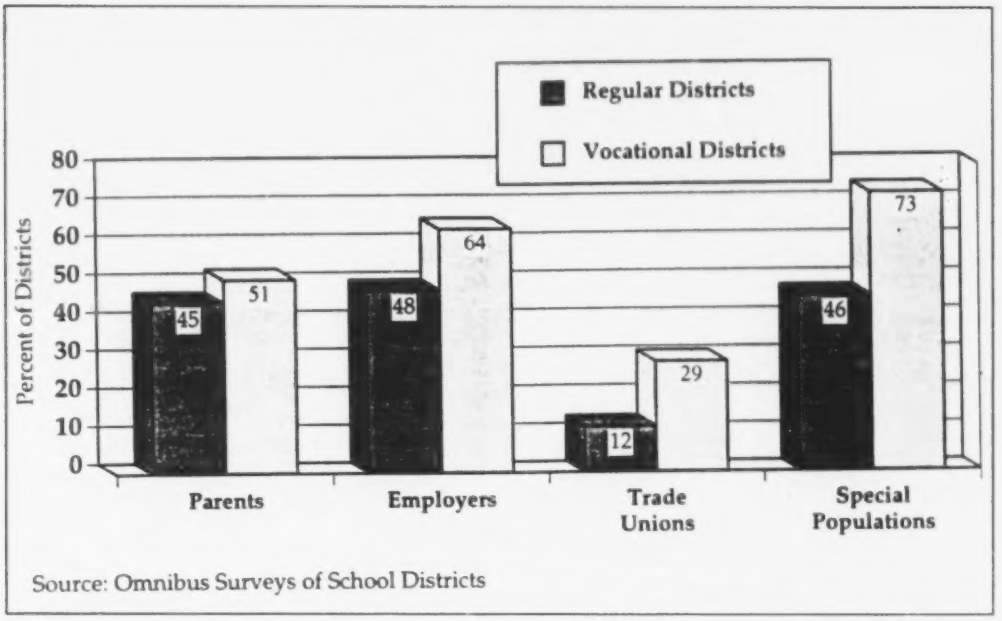


Figure 6.4. Groups that helped develop local plans.

State Adoption of Standards and Measures

Most states intended to use a far greater number and variety of measures than the minimum required in the Act. On average, state directors reported using or planning to use 11 of the 17 measures listed in the survey in their statewide systems in 1992-93, and they reported little difference between the number of measures to be used at the secondary and postsecondary levels. Measures can be grouped into six general types (consistent with the categories used in the Act); more than 80 percent of the states intended to include at least five of the six types of measures in their systems (see Figure 6.5).

A separate question on measures of labor market outcomes reveals that approximately one-half of the states also used or intended to use measures of employer satisfaction in addition to those measures reported above. (See Appendix Tables A-6.6 and A-6.7 for data on the broad range of outcome measures, and Table A-6.8 for data regarding additional measures of labor market outcomes.)

State progress in adopting statewide standards and measures can also be described in terms of changes in the use of measures. Figure 6.6 shows the increase from 1991-92 to 1992-93 in the percentage of states that used or anticipated using each type of measure. The pattern was the same at the

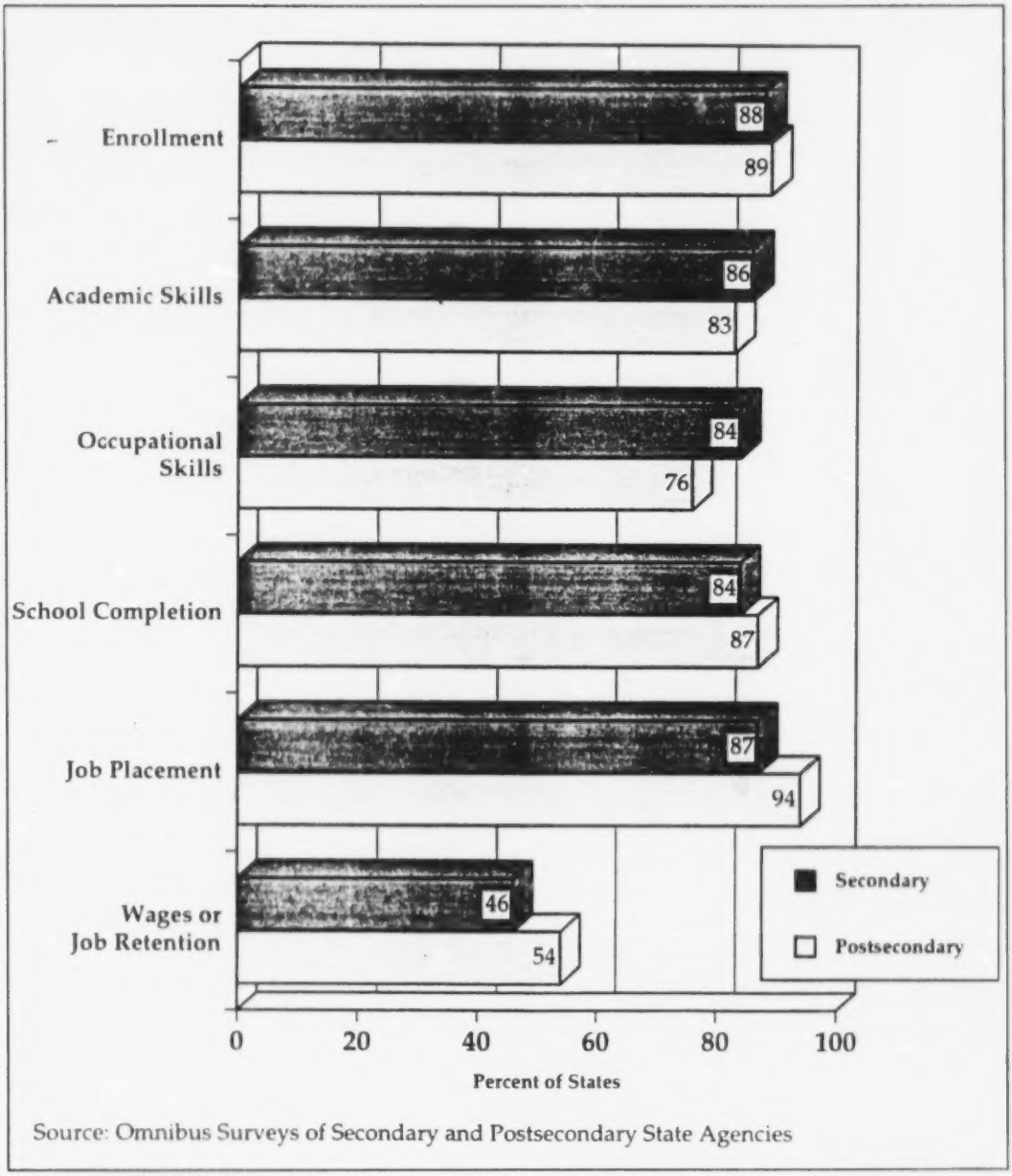


Figure 6.5. States' intended use of measures in 1992-93.

secondary and postsecondary levels. On average, states planned to add four measures at both secondary and postsecondary levels over this time period.

The most dramatic change was the growth in the number of states planning to adopt measures of academic and occupational skills, which were mandated in

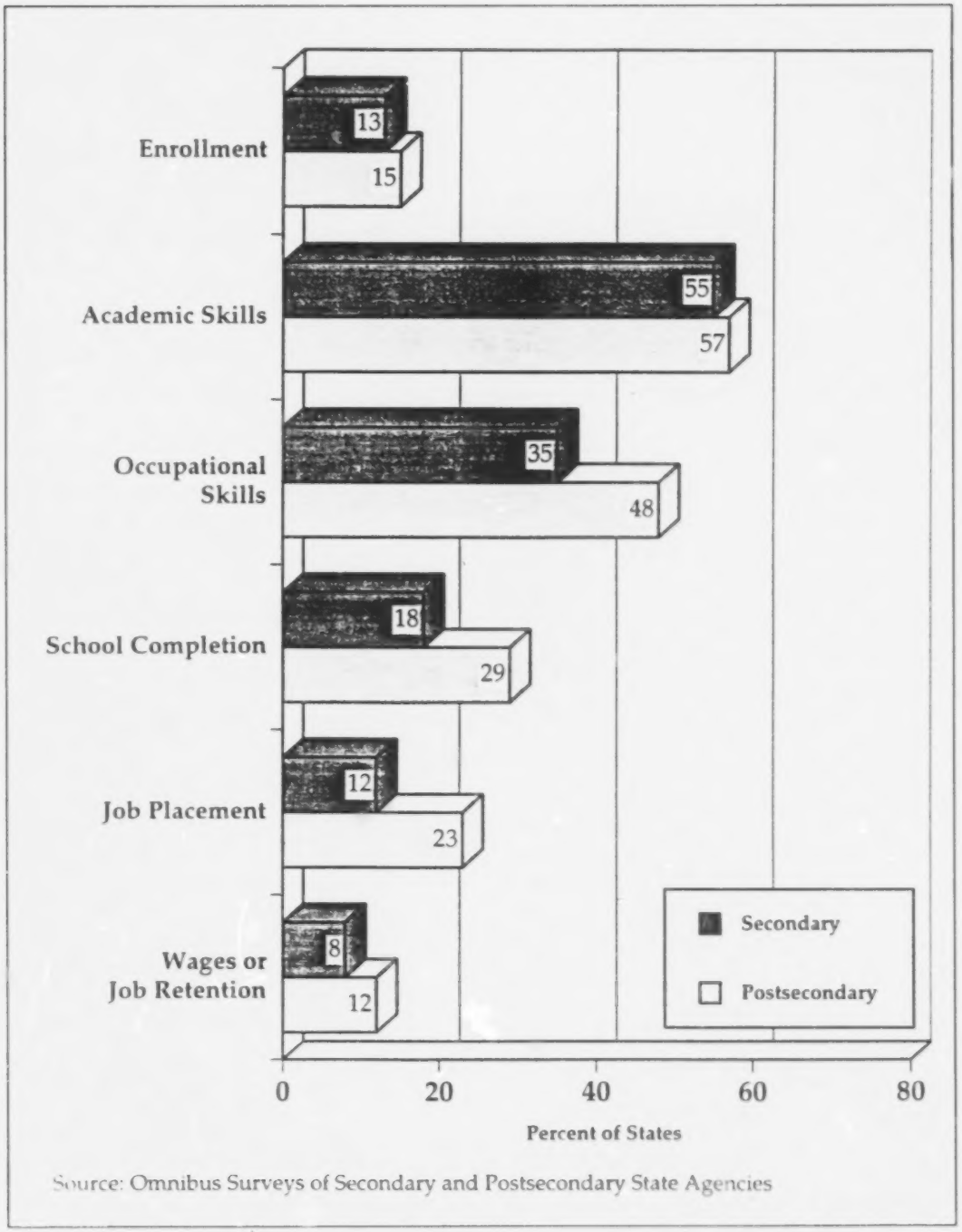


Figure 6.6. Increase in states' intended use of measures in 1992-93 compared to actual use prior to 1991-92.

the 1990 Perkins Act but had not been required previously. Smaller numbers of states planned to add measures of enrollment or labor market outcomes during this time period.

Measurement of Academic and Occupational Skills

The previous results indicate that in terms of assessment, the major impact of the Perkins Act is in the areas of academic and occupational skills. Although the majority of states were adding measures of basic academic skills, advanced academic skills, and occupational skills to their statewide systems, they were not taking the same approach to measuring each type of skill.

As of 1991-92, at the secondary level, state-developed tests played a large role in measuring all three kinds of skills. Basic skills were measured most often with state-developed tests, commercially developed tests, and formal teacher ratings. Occupational skills were measured most often by formal teacher ratings, state-developed tests, and informal teacher judgments (see Appendix Figure A-6.1).

At the postsecondary level, very few states planned to use state-developed instruments for measuring any of the skills (see Figure 6.7). Otherwise, the choice of assessment strategies was similar at the secondary and postsecondary levels.

In 1991-92, less than one-half of all regular secondary districts measured advanced academic skills or occupational skills in any form (see Table 6.1). Although we cannot directly compare the percentage of districts collecting skill data with the percentage of states including such data in their statewide system, we can make some very general statements about differences between district actions and statewide intent (as described in the preceding section). Far less use was made of any skill measures (basic academic skills, advanced academic skills,or occupational skills) at the district level in 1991-92 than states intended for 1992-93. If states followed through with the plans they described in the survey, it would represent a substantial change from past practices regarding the direct assessment of skills by public secondary districts.

Examining district practices further, we find that vocational districts and regular secondary districts used similar techniques for measuring basic academic skills, but differed noticeably in their practices regarding advanced academic and occupational skills. About three-fourths of vocational districts, but only about one-third of regular high school districts, assessed occupational skills in any way. In contrast, regular districts were somewhat more likely to assess advanced academic skills (see Table 6.1). These differences are consistent with traditional views of the goals of regular high schools and secondary vocational schools.

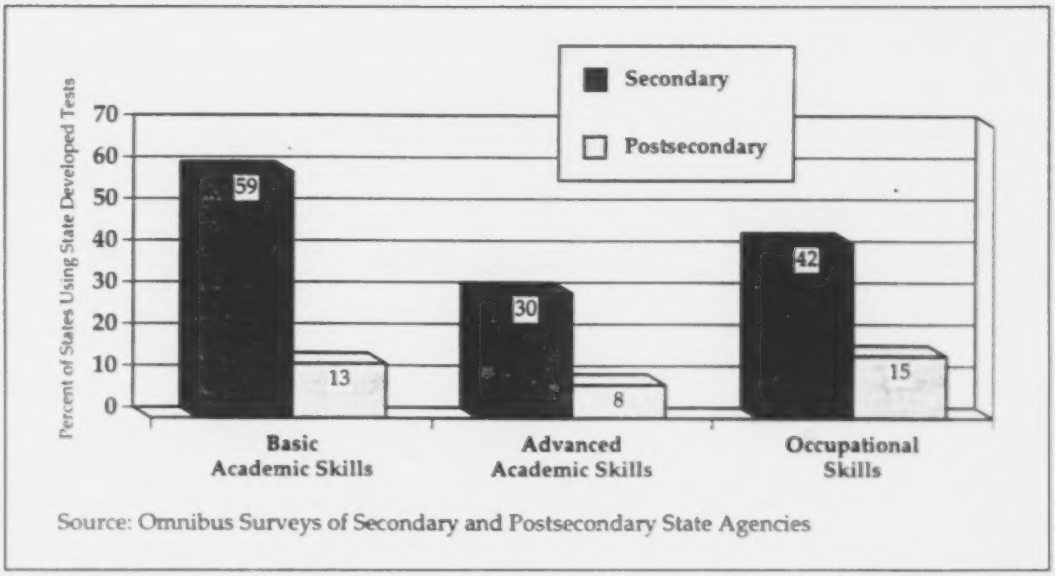


Figure 6.7. Intended use of state-developed tests to measure three types of skills.

Table 6.1
Assessment of Academic and Occupational Skills at the Secondary Level in 1991-92 (Percent of Districts)

Specific Measure	Basic Academic Skills	Advanced Academic Skills	Occupational Skills
Regular Districts			
Any measure	51	41	36
Commercially developed test	39	32	12
State-developed test	33	21	12
Locally developed test	19	14	16
Informal teacher judgment	39	32	30
Formal teacher ratings	42	33	31
Vocational Districts			
Any measure	62	31	74
Commercially developed test	43	16	26
State-developed test	26	10	31
Locally developed test	26	11	51
Informal teacher judgment	42	18	56
Formal teacher ratings	45	22	68

Source: Omnibus Surveys of Regular and Vocational Districts.

Populations Included

Many states are applying their Perkins standards and measures to the widest possible group of vocational students. Almost all states are extending their statewide accountability systems to include additional students beyond those in locations funded by the Perkins Act. At least one-half of the states will apply their performance-based systems of accountability to all students taking vocational, occupational, or technical courses (see Table 6.2).

Table 6.2
Application of Performance Standards and Measures to Specific Groups of Students (Percent of States)

Student Groups to Which State Standards and Measures Apply	Secondary Level	Post-Secondary Level
All students taking vocational, occupational, or technical courses	64	50
Only students in Perkins-funded programs	11	13
Only those meeting a state definition of a vocational student	18	--
Vocational students only, but definition has yet to be developed	18	--
Only completers of programs, degrees, or certificates	7	13
Other	4	13

Source: Omnibus Surveys of Secondary and Postsecondary State Agencies

Adjustments to Standards

The Perkins Act permits states to establish formal procedures for adjusting state performance standards to accommodate special populations, school resource limitations, and local market conditions. One-half the states intended to make adjustments for special populations and local market conditions by 1992-93; slightly fewer planned to adjust standards based on school resources. The pattern of adjustments was similar at the secondary and postsecondary levels, with approximately 10 percent more states having established procedures for each type of adjustment at the secondary level than at the postsecondary level. Most of these state-level adjustments were not in effect prior to 1990. (See Appendix Table A-6.9).

Local Data Collection and Reporting

As noted earlier, the final adoption of statewide standards and measures should have brought some changes to local data collection and reporting practices, but neither states nor districts were starting from scratch. More than one-half of secondary districts and two-year postsecondary institutions already collected data on almost all types of measures. In fact, many measures were collected by 90 percent of the schools and institutions that were surveyed (see Table 6.3). This suggests that schools have relevant experience that provides a good foundation on which states can build systems of measures and standards.

Table 6.3
Collection and Reporting of Measures at the Secondary and Postsecondary Levels in 1991-92 (Percent)

Type of Measure	Collecting	Reporting
Secondary Vocational Districts		
Enrollment	100	100
Academic skills	67	29
Occupational skills	92	39
Completion or retention	97	93
Placement	97	87
Wages or job retention	72	58
Regular Secondary Districts		
Enrollment	97	95
Academic skills	73	49
Occupational skills	62	37
Completion or retention	90	84
Placement	78	61
Wages or job retention	36	28
Two-Year Postsecondary Institutions		
Enrollment	98	95
Academic skills	79	35
Occupational skills	46	22
Completion or retention	95	83
Placement	91	70
Wages or job retention	72	51

Source: Omnibus Surveys of School Districts and Postsecondary Institutions.

Differences in reporting practices between vocational and regular high school districts are consistent with traditional distinctions between these types of schools. In 1991-92, vocational districts were more likely than regular districts to report information on placements and wage or job retention, while regular districts were more likely to report information on academic measures.

It is interesting to note that many of the data that were collected by schools were not reported to states. It is possible that these measures were collected to serve local purposes only, and were not required by state agencies.

CONCLUSION

The 1990 Perkins Act embodies a new vision of accountability in vocational education. The cornerstones of the new approach are statewide systems of standards and measures that serve as yardsticks for local program review and improvement. This chapter explores two questions regarding these systems: How much progress have states made toward implementing these standards by the fall 1992 target date? What types of standards and measures do states intend to adopt?

The Implementation Process

The National Assessment of Vocational Education occurred relatively early in the implementation process, but the surveys provide useful information about states' preparations to comply with Perkins requirements for standards and measures. The main conclusions we draw about state progress in implementing Perkins are as follows:

- States made substantial progress toward implementing systems of performance standards and measures. Over 80 percent of the states expected to adopt secondary and postsecondary performance standards and measures by the end of the 1992-93 school year.[3] Over one-half of the states already had done so during 1991-92. By 1991-92, more than two-thirds of the states said they were developing new measures to meet their Perkins needs.

- States implemented systems of standards and measures in a "top-down" manner. Over 80 percent of the states reported increased staff responsibilities for standards and measures at the state level, but there was relatively little activity among secondary and postsecondary schools and districts.

- In most states, vocational educators were the key players in selecting measures and standards. Special education staff also were involved to a large extent. Employers, students, parents, and other interest groups, in contrast, had limited roles in the adoption process in most states.

- Perkins Act reforms tended to be adopted together. States that were aggressively promoting vocational/academic integration were the most active in implementing systems of standards and measures.

Policy Implications

The surveys also contain information relevant to some of the broader policy questions that will be asked as systems of performance standards and measures are fully implemented.

Are districts and schools prepared to assume their roles in the accountability system envisioned by the Perkins Act? Once states have built the framework of standards and measures, the responsibility for using the system as a tool to improve programs falls to districts and schools. The surveys indicate that at least initially, few states have devoted any resources to planning for measures and standards. Lack of attention to training might be understandable at this early stage of development, but it would be unfortunate to report the same conclusion after systems had been fully implemented.

On the other hand, the surveys reveal that most school districts and two-year postsecondary institutions were already actively collecting relevant student data, some which was reported to states and some of which appeared to be for local purposes. This suggests at least some familiarity with student assessment or program evaluation activities, which may help institutions meet Perkins Act accountability demands.

Does the implementation of standards and measures differ significantly at the secondary and postsecondary levels? It is clear from the surveys that the statewide systems of standards and measures create somewhat different challenges for secondary and postsecondary institutions. For example, comprehensive high schools reported that they did not regularly use measures of occupational skills in their vocational programs, while postsecondary schools were less likely to be collecting measures of advanced academic skills. Both types of measures must be included in statewide systems, so institutions at the two levels face different challenges and states must be prepared to respond to different types of problems.

Are new assessment instruments of adequate quality to support decisions about students and programs? Many states reported that they were developing new assessment instruments, particularly at the secondary level. While some states had been working on these assessments for years and had devoted considerable resources to the effort, others had less experience in assessment development. It will be important to examine the reliability and validity of new instruments developed specifically for Perkins Act accountability systems. Poor-quality measures could undermine the utility of the whole system.

Can a common core of measures in all states serve as a basis for national assessment or state-to-state comparison? The survey was conducted too early in the implementation cycle to indicate whether the measures chosen can be

aggregated or compared nationally. The survey findings do, however, support tantalizing inferences. The widespread use of multiple measures offers fertile ground for finding comparable measures, and nothing in states' actions precludes this happening.

However, the survey also reveals variability among states, and we suspect that without coordination of state actions, differences will predominate. It is clear that states are actively engaged in a process of change. If the federal government wanted to act to promote some degree of standardization, this would have been an opportune time to do so. It is much more difficult to achieve common measures once state systems are adopted and operational.

What effects do systems of performance standards and measures have on vocational programs? The ultimate test of the Perkins model of accountability is whether these systems improve or hinder the effectiveness of vocational education programs at the secondary and postsecondary levels. While there is some evidence from the survey that schools have had positive experiences with performance standards in the past, the survey occurred much too soon to obtain credible information about impact.[4] Additional research will be necessary to judge how standards and measures affect programs. This is the most significant question about performance standards and measures that remains unanswered.

ENDNOTES

1 Final federal guidelines for implementing the Act had not been issued at the time of the survey. States were operating on the basis of preliminary guidelines.

2 To measure "aggressiveness in promoting vocational/academic integration," states were assigned to quartiles based on the number of different integration-related activities they reported in the current and previous school year. This variable was then cross-tabulated with the questions relating to the development of performance standards and measures.

3 All states had developed systems of measures and standards by fall 1992, but a few were still awaiting official adoption as late as spring 1993 (personal communication with M. Rahn, National Center for Research on Vocational Education, February 18, 1993).

4 Specifically, local administrators at two-year postsecondary institutions, vocational school districts, and regular school districts were asked to rate ten different changes contained in the Perkins Act in terms of their probable impact on administering and implementing vocational programs in their institution. On average, most of these reforms, including performance standards and measures, received a neutral rating. Practitioners were somewhat more positive; most agreed (49%) or strongly agreed (11%) that "the performance standards and accountability procedures used in this school have improved vocational education practice and vocational students' competency attainment." This suggests that schools have had positive experiences with performance-based accountability in vocational education, which may provide a positive foundation on which Perkins can build. At the time of the survey, however, states had not yet adopted final standards, and schools and districts had no experience evaluating programs in light of statewide standards. Consequently, respondents had to base these judgments of likely impact on partial knowledge, at best.

CHAPTER 6 APPENDIX

Table A-6.1
Steps Toward Developing a System of Measures and Standards at the Secondary Level (Percent of States)

Developmental Steps	Before 1991-92	Done/ Continued 1991-92	Planned/ Continued 1992-93
Select from existing measures	45	64	68
Develop new measures	32	70	89
Assess the quality of measure chosen	29	59	86
Involve local program administrators in choosing measures	46	79	89
Examine existing data to determine performance levels	48	80	91
Establish performance standards	20	75	95
Utilize business/industry standards	32	55	64
Assess student performance using standards	18	32	77
Evaluate vocational programs using standards	41	55	86
Modify programs based on evaluation results	41	54	86

Source: Omnibus Survey of Secondary State Agencies

Table A-6.2
Steps Toward Developing a System of Measures and Standards at the Postsecondary Level (Percent of States)

Developmental Steps	Before 1991-1992	Done/ Continued 1991-1992	Planned/ Continued 1992-1993
Select from existing measures	52	67	73
Develop new measures	33	67	81
Assess the quality of measures chosen	29	58	92
Involve local program administrators in choosing measures	48	79	92
Examine existing data to determine performance levels	52	77	90
Establish performance standards	33	60	85
Utilize business/industry standards	35	48	56
Assess student performance using standards	35	46	85
Evaluate vocational programs using standards	56	67	94
Modify programs based on evaluation results	50	58	85

Source: Omnibus Survey of Postsecondary State Agencies

Table A-6.3
Uses of Perkins Title II Funds at the Secondary Level in 1991-92
(Percent of Districts)

Uses of 1992-92 Funds	Vocational School Districts	Regular School Districts
Did not receive Title II basic grant funds	10	26
Vocational improvement/expansion at the middle school level	10	13
Hiring vocational coordinators or other specialists	38	13
Hiring vocational teacher aids or para-professionals	40	15
Staff development	48	30
Release time for teachers	21	12
Reduced class sizes	3	2
Purchase of curriculum materials, including lab materials	50	33
Purchase of occupationally relevant equipment	47	30
Modifying existing curriculum materials	36	17
Curriculum development	42	25
Services for special population students	68	29
Purchase of computers, software, curricula for learning labs	40	28
Additional career counselors or guidance activities	38	17
Support of local curriculum coordinators or developers	27	10
Establishment or expansion of industry-education partnerships	29	5
Development or expansion of tech-prep programs	26	15
Development or expansion of vocational performance assessment system	28	11
Development of an all aspects of the industry" curriculum	6	3
Other	8	4

Source: Omnibus Surveys of School Districts

Table A-6.4
Uses of Perkins Title II Funds at the Postsecondary Level in 1991-1992
(Percent of Two-Year Public Postsecondary Institutions)

Uses of 1991-92 Funds	Two-Year Public Postsecondary Institutions
Hiring occupational/technical coordinators or other specialists	35
Hiring teaching assistants or paraprofessionals	38
Staff development	47
Release time for faculty	15
Reduces class sizes	2
Purchase of curriculum materials, including lab materials	55
Purchase of occupationally relevant equipment	56
Modification of existing curriculum materials	35
Curriculum development	39
Services for special population students	73
Purchase of computers, software, curricula for learning labs or other remedial programs	50
Additional career counselors or guidance activities	49
Support of local curriculum coordinators or developers responsible for integration	18
Establishment or expansion of industry-education partnerships	18
Development or expansion of tech-prep programs	31
Development or expansion of vocational performance assessment system	19
Development of an "all aspects of the industry" curriculum	5
Other	9

Source: Omnibus Survey of Postsecondary Institutions

Table A-6.5
Group Involvement in Developing States' Systems of Standards and Measures at Secondary and Postsecondary Level
(Percent of States)

Groups	Not Consulted	Consulted 1-2 Times	Consulted Regularly	Played Major Role
Secondary Level				
State legislators or staff	54	20	13	9
State vocational education officials	0	0	14	79
Employer representatives	7	21	48	18
Union representatives	27	32	25	9
School administrators	0	16	43	36
Local vocational education administrators staff	0	9	30	54
Special population group representatives	2	14	48	29
Parents	7	46	30	11
Students	14	43	27	11
Postsecondary Level				
State legislators or staff	58	15	15	6
State vocational education officials	0	0	17	73
Employer representatives	25	33	29	6
Union representatives	46	29	17	2
Occupational/technical faculty or administrators	2	8	27	52
Special population group representatives	6	17	44	27
Parents	33	29	27	4
Students	31	33	23	6

NOTE: Rows may not sum to 100% due to rounding.

Source: Omnibus Secondary and Postsecondary State Surveys

Table A-6.6
Use of Outcome Measures at the Secondary Level, Prior to 1991-92, During 1991-92, and Intended in 1992-93
(Percent of States)

Specific Measure	Prior to 1991-92	1991-92	1992-1993	Increase
Enrollment				
Program enrollment	70	70	79	9
Special population enrollment	68	75	86	18
Academic Skills				
Basic academic skills	30	41	84	54
Advanced academic skills	14	23	70	56
Occupational Skills				
Occupational skills	46	54	79	33
Employability skills	36	43	66	30
School Completion or Retention				
Course description	32	36	54	22
Program completion	50	54	66	16
Certification rates	20	20	36	16
Graduation rates	34	34	63	29
School retention	30	34	63	33
Job Placement				
Employment	71	75	84	13
Related employment	64	68	73	9
Military service	66	71	79	13
Additional training or education	64	73	80	16
Wages or Job Retention				
Entry wage	30	32	39	9
Job retention	18	20	25	7
Other	7	9	23	16

NOTE: Percentage change in use is the difference between use reported before 1991-92 and intended use in 1992-93.

Source: Omnibus Surveys of Secondary State Agencies

Table A-6.7
Use of Outcome Measures at the Postsecondary Level, Prior to 1991-92, During 1991-92, and Intended in 1992-93
(Percent of States)

Specific Measure	Prior to 1991-92	1991-92	1992-1993	Increase
Enrollment				
Program enrollment	71	75	79	8
Special population enrollment	54	67	81	27
Academic Skills				
Basic academic skills	25	33	79	54
Advanced academic skills	13	21	67	54
Occupational Skills				
Occupational skills	25	35	73	48
Employability skills	19	25	48	29
School Completion or Retention				
Course description	27	33	63	36
Program completion	50	58	77	27
Certification rates	27	29	33	6
Graduation rates	44	52	63	19
School retention	25	33	48	23
Job Placement				
Employment	67	75	88	21
Related employment	63	67	79	16
Military service	63	67	79	16
Additional training or education	63	69	83	20
Wages or Job Retention				
Entry wage	33	33	50	17
Job retention	21	23	29	8
Other	2	4	6	4

NOTE: Percentage change in use is the difference between use reported before 1991-92 and intended use in 1992-93.

Source: Omnibus Surveys of Postsecondary State Agencies

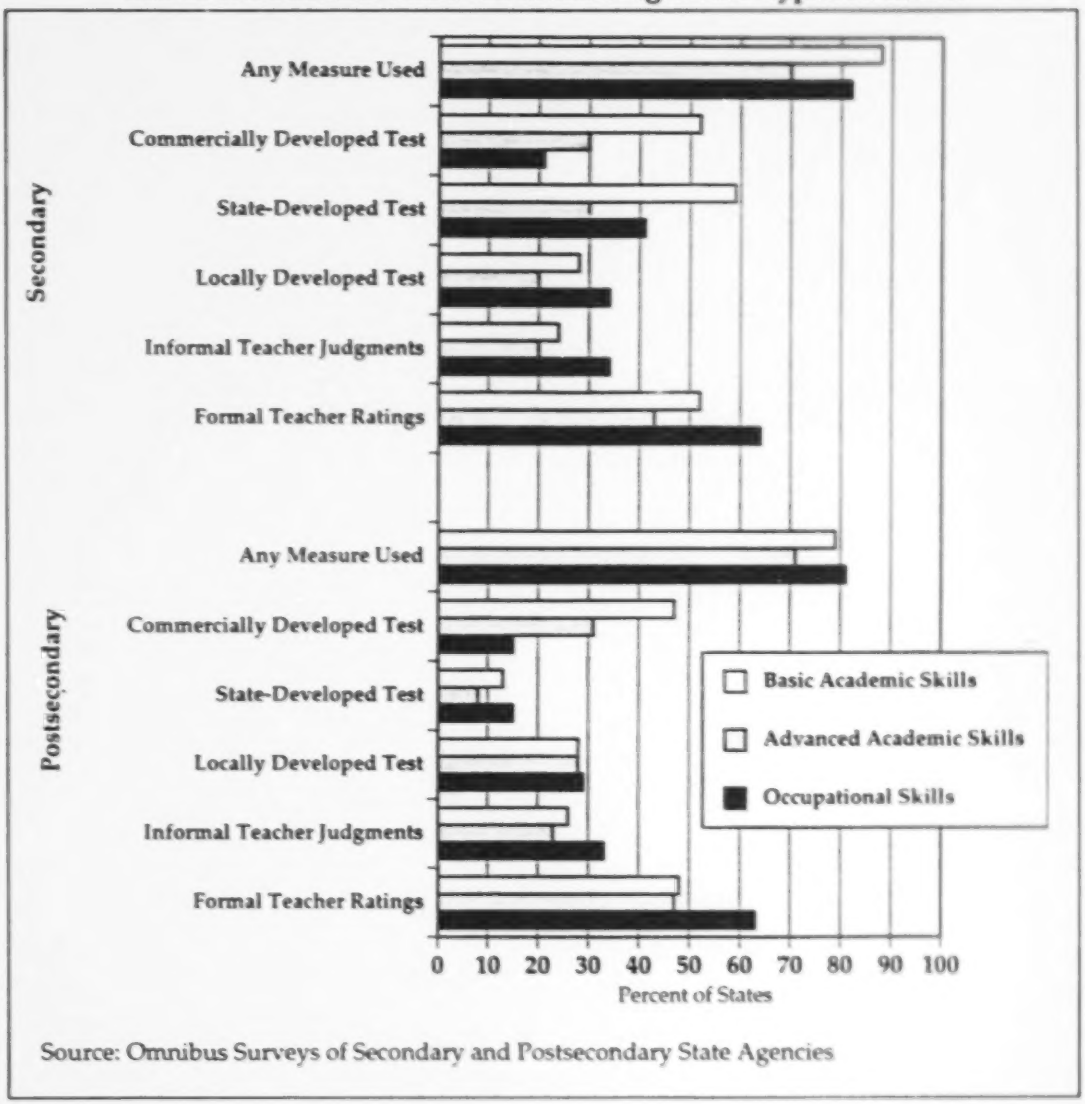
Table A-6.8
Use of Job Placement Measures in Statewide Systems at the Secondary and Postsecondary Levels
(Percentage of States)

Measures	Secondary Level	Postsecondary Level
Duration of job seeking	11	6
Earnings/wage levels	41	42
Length of stay in job	21	10
Employer satisfaction	52	50
Employee satisfaction	43	42
Other	11	15

NOTE: For each category, approximately 20% (or more) of state directors were still unsure whether these or other job placement measures will be used as part of their performance measurement systems.

Source: Omnibus Surveys of Secondary and Postsecondary State Agencies

Figure A-6.1
Use of Assessment Tools for Measuring Three Types of Skills



Source: Omnibus Surveys of Secondary and Postsecondary State Agencies

Table A-6.9
Adjustments to Performance Standards, Prior to 1991-92, During 1991-92, and Intended in 1992-93
(Percent of States)

Adjustment for	Prior to 1991-92	1991-92	1992-93	Increase
Secondary				
Disabled students	23	36	61	38
Disadvantaged students	18	32	57	39
LEP students	20	32	57	37
Other special populations	4	9	14	10
School resources	18	32	45	27
Local labor market	21	36	52	31
Postsecondary				
Disabled students	17	23	50	33
Disadvantaged students	17	21	48	31
LEP students	15	19	46	31
Other special populations	2	6	8	6
School resources	7	27	33	16
Local labor market	21	31	46	25

NOTE: Percentage increase is the difference between use reported before 1991-92 and intended use in 1992-93.

Source: Omnibus Surveys of Secondary and Postsecondary State Agencies

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